EFFECTIVENESS OF EXERCISES ON PAIN AND SLEEP AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY IN SELECTED HOSPITALS AT ERODE.

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A DISSERTATION SUBMITTED TO THE TAMILNADU DR.M.G.R MEDICAL UNIVERSITY, CHENNAI IN PARTIAL FULLFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF

MASTER OF SCIENCE IN NURSING

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CERTIFICATE

This is to certify that the dissertation entitled **"EFFECTIVENESS OF EXERCISES ON PAIN AND SLEEP AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY IN SELECTED HOSPITALS AT ERODE"** is a bonafide work done by **MS. JENI.V M.SC(N)** II year Bishop's College of Nursing, Dharapuram in partial fulfillment of the university rules and regulations for award of Masters of Science in Nursing under my guidance and supervision during the academic year 2013-2015.

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Philippians:4:13

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ABSTRACT

Diabetes is a chronic condition that occurs when the pancreas does not produce enough insulin or the body cannot effectively use the insulin it produced by hyperglycemia and other related disorders in the body's metabolism can lead to serious damage to many of the body systems especially of nerves and blood vessels. Diabetic complications are classified in to two major categories like acute and chronic. The acute complications of diabetes include diabetic ketoacidosis, hyperosmolar hyperglycemic syndrome, hypoglycemia. The chronic complications of diabetes again classified in to micro vascular and macro vascular complications. The micro vascular complications include diabetic retinopathy, diabetic nephropathy, diabetic neuropathy. Macro vascular complications are stroke, hypertension, insulin resistance syndrome. Diabetic peripheral neuropathy is nerve damage that occurs because of the metabolic degenerations associated with diabetes mellitus. The most common symptoms of diabetic peripheral neuropathy include pain, burning, tingling, or numbness in the toes or feet, and extreme sensitivity to light touch. The pain may be worst at rest and improve with activity, such as walking. Some people initially have intensely painful feet while others have few or no symptoms. Diabetic peripheral neuropathy usually affects both sides of the body. Diabetic peripheral neuropathy treated with main three components that is , tight control of blood sugar levels , care for the feet to prevent complications and Control of pain caused by neuropathy. Diabetic patients are encouraged to follow a daily leg exercises , foot care regimens like washing , and inspecting the foot proper fitting shoes can prevent major complications.

A study was done to evaluate the effectiveness of exercises on pain and sleep among patients with diabetic peripheral neuropathy in selected hospitals, Erode.

An Evaluative approach was used for this study. The research design used was Quasi experimental non equivalent pre test and post test control group design. The conceptual framework of the study was based on the "Modified Ludwig Von Bertlanffy System theory (1968). Non probability purposive sampling method was used to select 60 samples for the study. 30 samples were in experimental group was selected from S.R.C diabetes care centre Erode and 30 samples were in control group was selected from Monika diabetes care centre

Erode. The tool used for this study was Leeds Assessment of Neuropathic Signs and Symptoms Scale to assess the level of pain and Sleep Scale from medical outcome of study to assess the level of sleep, exercises was given to the patients with diabetic peripheral neuropathy for 30 minutes once in a day for a period of 15 days in experimental group.

The data gathered were analyzed by using descriptive and inferential statistics. The mean post test level of pain in experimental group 9.6(SD±3.15) was significantly lower than the mean posttest level of pain in control group 15.9(SD±2.99) The mean difference was 6.3.The Independent‘t’ value was 8.51which was significant at $p<0.05$ level. The mean post test scores of sleep in experimental group 47.7 (SD±5.56) was significantly higher than the mean post test scores of sleep in control group 34.2(SD±7.03). The mean difference was 13.5.The independent‘t’ value was 8.88which was significant at $p<0.05$ level. The mean post test scores of pain and sleep among patients with diabetic peripheral neuropathy in experimental group were 9.6(SD±3.15) and 47.7 (SD±5.56) respectively. The mean difference was 38.1. The ‘r’ value was -0.9 which showed that negative relationship between pain and sleep scores among patients with diabetic peripheral neuropathy in experimental group. It reveals that as the pain level decreases sleep pattern was improved.

The study findings revealed that there was a significant association between post test level of pain among patients with diabetic peripheral neuropathy with demographic variables of marital status($\chi 2=7.74$), family monthly income($\chi 2=9.65$), and duration of treatment for diabetic peripheral neuropathy($\chi 2=7.66$) at $p<0.05$ level of significance and no significant association between post test level of sleep score in experimental group. There is a decreased level of pain and improvement in the level of sleep pattern among patients with diabetic peripheral neuropathy after exercises. The study findings revealed that practicing exercises is beneficial for patients with diabetic peripheral neuropathy for decreasing pain and improving sleep pattern.

CHAPTER-I

i) INTRODUCTION

BACKGROUND OF THE STUDY:

"Live simply, eat wisely, exercise regularly and live happily-away from diabetes"

World diabetes day .,(2014)

Health is a state of complete physical, mental, and social well being, and not merely the absence of disease or infirmity. .Health is a dynamic condition resulting from a body's constant adjustment and adaptation in response to stresses and changes in the environment for maintaining an inner equilibrium called homeostasis.

Medical dictionary., (2013)

Wellness is "an integrated method of functioning which is oriented toward maximizing the potential of which the individual is capable. It requires that the individual maintain a continuum of balance and purposeful direction within the environment where is functioning. "wellness is a direction in progress toward an ever-higher potential of functioning"

HalbertDunn M.D., (2006)

Illness is a subjective state in a human marked by feelings of deviation from the normal healthy state

Medical dictionary., (2013)

Disease may be caused by factors originally from an external source, such as infectious disease, or it may be caused by internal dysfunctions, such as autoimmune diseases. Diseases usually affect people not only physically, but also emotionally, as contracting and living with many diseases can alter one's perspective on life, and their personality.

John D., (2010)

The endocrine system and the nervous system are two of the primary communicating and coordinating systems in the body. The nervous system communicates through nerve impulses; the endocrine system communicates through chemical substances known as hormones, and it plays a role in reproduction, growth and development and regulation of energy. The endocrine system is composed of glands and glandular tissues that produce,

store, and secrete hormones that travels through the blood to specific target cells throughout the body.

Lewis., (2007)

Diabetes is a chronic condition that occurs when the pancreas does not produce enough insulin or the body cannot effectively use the insulin it produced by hyperglycemia and other related disorders in the body's metabolism can lead to serious damage to many of the body systems especially of nerves and blood vessels.

WHO.,(2005)

Diabetes mellitus is a chronic multisystem disease related to abnormal insulin production, impaired insulin utilization or both.

Lewis., (2007)

Diabetic complications are classified in to two major categories like acute and chronic. The acute complications of diabetes include diabetic ketoacidosis, hyperosmolar hyperglycemic syndrome, hypoglycemia. The chronic complications of diabetes again classified in to microvascular and macrovascular complications. The microvascular complications include diabetic retinopathy, diabetic nephropathy, diabetic neuropathy. Macrovascular complications are stroke, hypertension,insulin resistance syndrome.

Lewis., (2007)

Over a long period of time, hyperglycemia damages the retina of the eye, the kidneys, the nerves, and the blood vessel. Damage to the nerves from diabetes (diabetic neuropathy) is a leading cause of foot ulcers and wounds which frequently lead to foot and leg amputations.

Robert . J. berry ., (2011)

Diabetic peripheral neuropathy is nerve damage that occurs because of the metabolic degenerations associated with diabetes mellitus.

Lewis., (2007)

Diabetic Peripheral neuropathy or sensory motor neuropathy or distal symmetric neuropathy is the nerve damage in the arms and legs . It leads to loss of protective sensation in the toes, which extends to involve the feet and legs in a stocking distribution. Muscle weakness and loss of reflexes occurs causing changes in the way the person walks. Numbness develop, blisters and sores may appear resulting in sepsis leading to infection of bone and the foot.

Stacy. B., (2005)

The most common type of neuropathy affecting persons with diabetes is sensory neuropathy. This can lead to the loss of sensation in the lower extremities, and coupled with other factors, this significantly increases the risk for complications that result in a lower limb amputation. More than 60% of nontraumatic amputations in the United States occurs in people with diabetes.

Lewis., (2007)

In people with type 1 or type 2 diabetes, the biggest risk factor for developing diabetic peripheral neuropathy is having high blood sugar levels over time. Other factors can further increase the risk of developing diabetic neuropathy, including coronary artery disease , increased triglyceride levels, being overweight (a body mass index >24) , smoking and high blood pressure

Eva L. Feldman et al., (2012)

The most common symptoms of diabetic peripheral neuropathy include pain, burning, tingling, or numbness in the toes or feet, and extreme sensitivity to light touch. The pain may be worst at rest and improve with activity, such as walking. Some people initially have intensely painful feet while others have few or no symptoms. Diabetic peripheral neuropathy usually affects both sides of the body. Symptoms are usually noticed first in the toes. If the disease progresses, symptoms may gradually move up the legs; if the mid-calves are affected, symptoms may develop in the hands. Over time, the ability to sense pain may be lost, which greatly increases the risk of injury.

Jeremy M. shfner., (2011)

Diabetic peripheral neuropathy disrupts the body’s ability to communicate with its muscles, organs, and tissues. Symptoms can include numbness, tingling, weakness, and

pain. With early diagnosis, it can often be controlled and quality of life restored. If ignored, symptoms can intensify to loss of sensation, weakness, unremitting pain, and/or disability.

Stephane zahala.,(2013)

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.

International Association for the Study of Pain., (2011)

Sleep is defined by a natural periodic state of rest for the mind and body, in which the eyes usually close and consciousness is completely or partially lost, so that there is a decrease in bodily movement and responsiveness to external stimuli. During sleep the brain in humans and other mammals undergoes a characteristic cycle of brain-wave activity that includes intervals of dreaming.

Medical dictionary., (2010)

Diabetic peripheral Neuropathy can impact sleep in a number of ways. For some, the symptoms may cause the sleep disturbances e.g., diabetic peripheral neuropathic pain makes it difficult to fall asleep or stay asleep; abnormal sensations or hypersensitivity to touch, particularly in the feet and legs makes it difficult to fall asleep.

Gardiner.N.J.,(2013)

Diabetic peripheral neuropathy is diagnosed based upon a medical history and physical examination of the feet. During an examination, there may be signs of nerve injury, including , Loss of the ability to sense vibration and movement in the toes or feet (eg, when the toe is moved up or down) , Loss of the ability to sense pain, light touch and temperature in the toes or feet , Loss or reduction of the Achilles tendon reflexMore extensive testing, other studies like nerve conduction studies, nerve biopsy, or imaging tests (eg, x-ray or CT scan), is not usually needed to diagnose diabetic neuropathy.

John F. dashe., (2010)

Diabetic peripheral neuropathy treated with main three components that is, Tight control of blood sugar levels, Care for the feet to prevent complications and Control of pain caused by neuropathy.

Soulis., (2006)

Lifestyle modification included advice on physical activity (30 min of brisk walking per day) and reduction in total calories, refined carbohydrates and fats, avoidance of sugar, and increase in fiber-rich foods are used as an effective management of diabetic peripheral neuropathy.

Andrews athams., (2005)

Begonia roxburghii, Calamus tenuis, Callicarpa arborea, Cuscuta reflexa, Dillenia indica are the plants used to control the glucose level and help to prevent diabetic complications.

Ethnopharmacol., **(2012)**

Allium sativum is more commonly known as garlic, and is thought to offer antioxidant properties and micro-circulatory effects and prevent diabetic micro and macro vascular problems.

Diabetes .co.uk.,(2012)

The benefits of exercise in patients with diabetes, may include the reduced heart disease, prevention of diabetes in those at high risk, improved muscle sensitivity to insulin, better blood sugar control, better blood cholesterol profiles, better blood pressure control, potential weight loss, improved general sense of well being

Medicine., (2014)

Buerger allen exercises is a specific exercises for diabetic peripheral neuropathy. In this the legs are elevated for 2 to 3 minutes, down 5 to 10 minutes and then flat on the bed for 10 minutes. It helps to improve circulation to the feet and legs.

Arthur. W., (2012)

Exercise that involves being upright and putting pressure on the feet, called weight-bearing exercise, can increase the chance of injury to the feet. But simple foot exercises like foot massage, foot rolling foot bending, marching and walking is helpful to prevent diabetic nerve complications and help to promote circulation to the lower extremities.

Madline vann., (2011)

The nursing care of patients those with diabetic peripheral neuropathy are difficult to manage because of their range of pain symptoms and their need for higher levels of pain medication. Enhancing a solid knowledge base for the various causes of nerve damage leading to nerve pain can help the advanced practice nurse to choose effective therapeutic options. With so many medications to treat a wide variety of symptoms, it can be hard for nurse practitioners to prescribe the best medication. By dividing the medications into tiers based on efficacy, Nurse Practitioners will be able to effectively treat Diabetic Peripheral Neuropathy. Effectively treating patient's pain will optimize health care resources.

Carol Wamboldt., (2012)

Diabetic complications such as poor circulation and nerve damage can result in loss of sensation and slower wound healing in the lower extremities, which can lead to the formation of diabetic foot ulcer. Diabetic patients are encourage to follow a daily leg exercises , foot care regimens like washing , and inspecting the foot proper fitting shoes can prevent major complications.

Juliehumpton., (2010)

The World Diabetes Day 2014 campaign marks the first of a three-year (2014-16) focus on **"healthy living and diabetes"**. This year's activities and materials will specifically address the topic of healthy eating and its importance both in the prevention of type 2 diabetes and the effective management of diabetes to avoid complications. All campaign activities will be continue to be informed by the slogan "**Diabetes: protect our future**."The campaign will continue to promote the importance of immediate action to protect the health and well-being of future generations and achieve meaningful outcomes for people with diabetes and those at risk.

International diabetes federation.,(2014)

Based on these alarming figures Government of India started National Diabetes Control Program on pilot basis during 7th Five year plan in 1987, but due to paucity of funds in subsequent years this program could not be expanded further in remaining years. The main objectives are, Prevention of diabetes through identification of high risk subjects

and early intervention in the form of health education, Early diagnosis of disease and appropriate treatment morbidity and mortality with reference to high risk group, Prevention of acute and chronic metabolic, cardiovascular, renal and ocular complication of the disease, Provision of equal opportunity for physical attainment and scholastic achievement for the diabetic patients, Rehabilitation of those partially or totally handicapped diabetes people.

National Institute of Health and Family Welfare.,(2009)

The Ministry of Health spearheaded a national consultation in 2005 to "identify action pathways and partnerships for implementing the Global Strategy in the context of India". To contain the increasing burden of Non-Communicable Diseases, Ministry of Health and Family welfare, Government of India, has launched the National Program on Prevention and Control of Diabetes, Cardiovascular diseases and Stroke on 8th January 2008 with the following objectives: Prevention and control of Non Communicable Diseases Awareness generation on lifestyle changes, Early detection of Non Communicable Diseases, Capacity building of health systems to tackle Non Communicable Diseases.

Ramesh varma., (2012)

NEED FOR THE STUDY:

Diabetic Peripheral neuropathy is nerve damage caused by chronically high blood sugar and diabetes. About 60% to 70% of all people with diabetes will eventually develop painful diabetic peripheral neuropathy, people with diabetes can reduce their risk of developing nerve damage by keeping their blood sugar levels as close to normal as possible.

Webmed.,(2014)

In worldwide diabetes mellitus is rapidly emerging as a global health problem that threatens to assume a pandemic level by 2030.The total number of persons with diabetes and its complications is projected to rise from 170 million in 2000 to 366 million by 2025. Diabetes is a silent epidemic , there are 246 million people in the world living with diabetes. This is almost 6% of the world's adult population.

Andrew. J.M. boulton .,(2013)

Annual incidence of 54 per 100,000 has been reported for diabetic peripheral neuropathy in an urban general population in the UnitedKingdom. prevalence estimates within the diabetes population ranged from 16.3% to 50% This variability in prevalence is likely due to differences in definition, method of assessment, and patient selection, 28.5% of

individuals with diabetes were estimated to have peripheral neuropathy defined as at least one insensate area upon monofilament testing of both feet.

National Health and Nutrition Examination Survey., (2013)

According to American diabetic association criteria, the prevalence of diabetic neuropathy was 4.7% in the urban and 1.9% in the rural areas. The prevalence of diabetic peripheral neuropathy according to WHO criteria was 5.6% and 2.7% among urban and rural areas respectively.

Fatima .,(2010)

Diabetes in Asians is five times the rate of the white population.

Med India .,(2014)

In India an overall prevalence of diabetic peripheral neuropathy was 2.1% in urban areas and 1.5% in rural areas. From the available region wise population based studies it is clear that in the last two decades, there has been a marked increase in the prevalence of diabetic peripheral neuropathy among both urban as well as the rural Indians, with southern India having the sharpest increase.

Mohan Pradeepa .,(2007)

The world wide incidence rate for diabetic peripheral neuropathy in men was 5.5%; and women 5.9% The incidence rate of impaired fasting glycaemia was 4.5% among the men and 3.5% among the women whereas the incidence rate of impaired glucose tolerance was 7.3% among the men and 8.5% among the women.

Hiroshi.et.al., (2014)

In North India prevalence studies in the rural areas were conducted in which reported that the prevalence of diabetic neuropathy in a rural locality near Delhi was 1.5 %. The prevalence has been reported to vary between 1.5 % in Delhi and 3.7% in Nagpur in rural areas. A prevalence of 4.6% was reported from Pohir, a rural area in Punjab, which was relatively higher compared to earlier surveys done in different cities.

John., (2008)

In Kolkata the earliest documented study on prevalence of diabetic peripheral neuropathy was done Out of the 96,300 medical records checked, 38% was found to have diabetic neuropathy was diagnosed.

Raymen., (2007)

Recently a National control of disease risk factor surveillance was conducted in six different geographical locations in India. There was a geographical difference in the overall prevalence of self-reported diabetes, with the centres in southern states having a higher prevalence [Trivandrum (9.2%); Chennai (6.4%)] compared with north [Delhi (6.0%); Ballabgarh (2.7%)], east [Dibrugargh (2.4%)] and west/central India [Nagpur (1.5%)]. Similar trends were observed even when categorized based on residential areas as urban, periurban/slum and rural areas, except for urban areas where Delhi had higher rates (10.3%) than Chennai (8.7%) and Dibrugarh (5.5%) had higher rates than Ballabgarh (4.8%)

Michele .,(2014)

In South India 60-70% of people with diabetes have some form of neuropathy and 75% peripheral neuropathy. The highest rates of neuropathy are among people who had diabetes for the past 25 year. Any organ of the body can be affected by diabetes and among the micro vascular complications of diabetes, neuropathy results in significant disability and morbidity.

Matsuo .et.al., (2013)

In Bangalore the prevalence of peripheral neuropathy was 64.1%, of which only 35.8% had adequate knowledge about peripheral neuropathy and its prevention. The study concluded that there is a need for educating the people with diabetes regarding early assessment of peripheral neuropathy and must be motivated to perform the clinical assessment annually on physician consultation.

Stevens .M.J .et.al., (2011)

In Kerala prevalence of diabetes is very high. A study from central Kerala reported a prevalence of diabetes at 20% and prediabetes at 11%. Another study from southern Kerala, showed a wide urban-rural gradient in age-standardized (30-64 years) prevalence of diabetes indicating an important role of lifestyle factors. The prevalence was 17% in urban, 10% in the midland, 7% in the highland, and 4% in the coastal regions

Reddy K.S., (2014)

The study showed that the age standardized prevalence of diabetic peripheral neuropathy was 12.1%. The prevalence in Chennai (13.5%), it was the highest rate of incidence in Tamil Nadu.

Gerry .,(2012)

The prevalence of diabetes in Chennai increased by 39.8 percent (8.3 to 11.6%); between 1995 to 2000 by 16.3 percent (11.6 to 13.5%) and between 2000 to 2004, by 6.0 per cent (13.5 to 14.3%). Thus within a span of 14 years, the prevalence of diabetes increased significantly by 72.3 per cent.

M**ohan.,(2009)**

The prevalence of diabetic peripheral neuropathy in coimbatore was 48.1%, of which was relatively higher compared to earlier surveys.

Stephenson.et.al., (2013)

The prevalence of diabetic peripheral neuropathy in erode was 67.1%, of which only 28.6% had adequate knowledge about peripheral neuropathy and its prevention and 19.98% people had foot ulceration due to improper awareness of diabetic peripheral neuropathy.

Thomas.P.K., (2013)

Steenkiste.et.al.,(2011) conducted a study on effects of diabetic leg exercises on pain and sleep, patients with diabetic peripheral neuropathy in pensylvania. Quasi experimental design was used.48 patients from diabetic clinic were randomly selected and before exercises the pain and sleep level was assessed. The exercises consisted of walking, foot massage, foot rolling, calf muscle exercises and marching. Significant improvement was shown in on sleep scale from medical outcome of study (n = 40) from 67.1 to 72.4, neurological symptom score was improved from 6.5(2.3) to 3.9(0.65) (p=0.007),sensory and motor impairment score was improved with 17.7(2.15) to 13.5(1.71) (p=0.003) (t=8.39: p=0.001).

Stenward.et.al.,(2011) conducted a study to determine the effectiveness of aerobic diabetic leg exercises on pain and anxiety among diabetic peripheral neuropathy patients in china . The sample size was 50. True experimental design was used in this study. The samples receives 30 minutes of leg exercises. And also the patients encouraged to walk 15 minutes per day. The exercises was continue for 3 weeks. The data were collected using leeds assessment of neuropathic symptoms and signs scale and hospital anxiety scale. The result shows that experimental group has significant improvement than the control group (7.57±2.71pre/4.67±3.71post) for pain and for anxiety (5.50±3.68pre/3.5±2.71post), (p=0.0073) (t=10.21)

Barbosa.et.al.,(2011) conducted a randamised control trial to evaluate the effect of low level foot exercises on pain and sleep among diabetic peripheral neuropathy patients in hospital setting in united states. 40 male and female patients with painful diabetic neuropathy participated in this study. Their ages ranged from 35 to 60 years with a mean of 52.1 ± SD 4.7 years. Patients were randomly assigned into two equal groups of 20, an experimental and a control group. The exercises group received foot exercises for 40 minutes per day for a period of 20 days. Pain intensity via, Leeds Assessment of Neuropathic Sign and Symptoms Scale, and Sleep Scale from Medical outcome of Study are evaluated pre- and post for both groups. Pain was significantly decreased from 10.21 to 5.37 ($p \leq 0.05$) and sleep score were significantly improved from 43.2 to 61.9 ($p \leq 0.05$) in the exercise group and it had a negative relationship with pain and sleep in experimental group(r=-0.8), while no significant change was obtained in the control group. Low level exercises and technique could be an effective therapeutic modality in reducing pain and improving sleep in patients with diabetic peripheral neuropathy.

The researcher observed during clinical experiences in Erode hospitals that the patients with diabetic peripheral neuropathy having more pain and they feel insomnia. The medication therapy was given out of many side effects like drug resistance and other complications. The researcher felt to help the patients to use exercises to ease them and to reduce pain and to improve sleeping pattern.

STATEMENT OF THE PROBLEM:

A study to evaluate the effectiveness of exercises on pain and sleep among patients with diabetic peripheral neuropathy in selected hospitals, Erode.

OBJECTIVES:

- To assess the pretest and post test level of pain among patients with diabetic peripheral neuropathy in experimental and control group.
- To assess the pre test and post test level of sleep among patients with diabetic peripheral neuropathy in experimental and control group.
- To compare the pre and post test level of pain among patients with diabetic peripheral neuropathy in experimental group.
- To compare the pre and post test level of sleep among patients with diabetic peripheral neuropathy in experimental group.
- To find the effectiveness of exercises on pain among patients with diabetic peripheral neuropathy between experimental and control group.
- To find the effectiveness of exercises on sleep among patients with diabetic peripheral neuropathy between experimental and control group.
- To find the relationship between the post test level of pain and sleep among patients with diabetic peripheral neuropathy in experimental group.
- To find the association between post test level of pain among patients with diabetic peripheral neuropathy with their selected demographic variables in experimental group.
- To find the association between post test level of sleep among patients with diabetic peripheral neuropathy with their selected demographic variables in experimental group.

OPERATIONAL DEFINITIONS:

Effectiveness:

"It means producing an intendend result

Erlentson.,(2007)

In this study effectiveness refers to extent of exercises has brought out about the significant difference between pre and post test which is measured in terms of brief pain inventory scale and sleep scale among patients with diabetic peripheral neuropathy by using statistical measurements and its score.

Exercise:

It means activity requiring physical effort, carried out to sustain or improve health and fitness.

Medical dictionary.,(2007)

In this study exercises refers to the exercises practiced 30mts of aerobic exercise technique once in a day. The 30 minutes exercises consist of ten steps. They are,

STEP-I

Foot massage :

Inspect the feet before starting the massage. Look for discoloration such as bluish purple spots, redness, sores, cracks in the skin, fungus on the toenails , dark spots, cold areas or anything else that stands out as abnormal. Be sure to look in between the toes and encourage the client to do the same every day. If they cannot reach their feet, have them place in a mirror on the floor to view their feet carefully. Experiment with light pressure while inspecting the feet. This should take about two minutes.

Begin with some light compression, using the whole hand. Spend about one minute on each foot lightly compressing the plantar and dorsal surfaces and all but tissue from the toes to the knee.

STEP II

Foot rolling exercises:

Sit in a chair with back straight, knees together. Lift right foot off the floor, place a round thick plastic bottle under the foot. Start to move the bottle front and back. Do this exercise five times. Lower the right foot to the floor and repeat the exercise with left foot.

STEP-III

Stretching the calf muscles:

Lean with the palms of the hand against a wall. Keep feet some distance away, the heels firmly on the floor. Bend arms 10 times, keeping back and legs straight.

STEP-IV

Tiptoe exercise:

Hold to a chair and raise and lower the body on the toes of one foot then the other.

STEP-V

Leg bends:

Hold chair. Put one foot forward and lower body straight down, keeping both feet on floor. Raise and lower 10 times. Change legs.

STEP-VI

Heel Raising:

Get up on the toes and then down on heels, about 20 times. Also try putting the whole first on one leg and then the other.

STEP-VII

Leg Sweeps:

Stand with one leg slightly raised, on a book for example. While holding to a chair or table swing the other leg back and forth 10 times. Change to the other leg. Repeat it.

STEP- VIII

Wave your feet:

Sit down on the floor and lean backwards. Shake the feet until they are relaxed and warm.

STEP-IX

Sitting leg pointers

Sit in a chair with back straight, knees together. Lift the right foot off the floor, straightening the right knee at the same time. Point the toes into the distance. Holding the leg out straight. Circle the ankle joint clockwise, then counterclockwise five times. Lower the right foot to the floor and repeat the exercise with the left foot.

STEP-X

March exercise:

Stand straight in a place. March in place lifting the knees higher each times.

Total duration of the exercises is 30minutes one session per day for 15 days individually for improving the sleep and reduce the pain.

Pain:

Pain has been defined as “an unpleasant sensory or emotional experience associated with actual or potential tissue damage”.

Odendal .,(2014)

In this study the pain refers the level of pain in foot among patients with diabetic peripheral neuropathy which is measured by using Leeds Assessment of Neuropathic Symptoms and Signs Scale and their scores.

Sleep:

Sleep is a period of rest for the body and mind, during which volition and consciousness are in abeyance and bodily functions are partially suspended; also described as a behavioral state, with characteristic immobile posture and diminished but readily reversible sensitivity to external stimuli.

Medical dictionary .,(2007)

In this study the sleep refers to the level of sleep among patients with diabetic peripheral neuropathy which is measured by using sleep scale from medical outcome of study and its scores.

Patients with Diabetic peripheral neuropathy:

Diabetic peripheral neuropathy is nerve damage that occurs because of the metabolic degenerations of nerves associated with diabetes mellitus.

Lewis., (2007)

In this study it refers to the persons diagnosed with diabetic peripheral neuropathy by using vibrometer with the age group of above 30 years, who are admitted in the ward for minimum stay of 16 days with underlying treatment.

HYPOTHESES:

H_1 : The mean post test level of pain score is significantly lower than the mean pre test level of pain score in experimental group.

H_2 : The mean post test level of sleep score is significantly higher than the mean pre test level of sleep score in experimental group.

H_3 : The mean post test level of pain score in experimental group is significantly lower than the mean post test level of pain score in control group.

H_4 : The mean post test level of sleep score in experimental group is significantly higher than the mean post test level of sleep score in control group.

H_5 : There will be a significant relationship between post test level of pain score and post test level of sleep score among patients with diabetic peripheral neuropathy in experimental group.

H_6 : There will be a significant association between post test level of pain score among patients with diabetic peripheral neuropathy and their selected demographic variables in experimental group.

H_7 : There will be a significant association between post test level of sleep score among patients with diabetic peripheral neuropathy and their selected demographic variables.

ASSUMPTIONS:

- Diabetic peripheral neuropathy patients experience pain and insomnia
- Nurses play a vital role in reducing the level of pain and improving sleep pattern among patients with diabetic peripheral neuropathy.

DELIMITATION:

This study is de limited to,

e) Data collection period was 6 weeks
f) Sample size was limited to 60

PROJECTED OUTCOME:

Exercises helps to maintain the peripheral blood flow thus it reduce the level pain and improve sleep pattern. It helps to reduce the cost and duration of treatment. It promotes comfort and improves the activity of daily living.

ii) CONCEPTUAL FRAME WORK

Conceptual frame work helps to express about abstract ideas in a more reality, understandable, or precise form of the original conceptualization. The conceptual frame work for this study was direction from general system theory (Ludwig von bertlanffy, 1968).

According to general system theory system is a set of interacting parts in a boundary which makes the system work well to achieve its overall objectives.

General system theory is useful in breaking the whole process into essential task to assure goal realization. The system is a set of elements which is in constant interaction with the environment, which is organized for the accomplishment of a goal. The aim of the study was to evaluate the effectiveness of exercises on pain and sleep among patients with diabetic peripheral neuropathy.

Bertlanffy explained that the system has 4 major concepts

- Input
- Through put
- Output
- Feedback

INPUT:

According to theory, input is the information that enters into the system from environment through its boundaries.

In this study, the input includes demographic variables such as Age, sex, marital status, educational status, religion, occupation, family monthly income, type of family, area of residence, duration of diabetic peripheral neuropathy, duration of treatment for diabetic peripheral neuropathy, assessing pretest level of pain and sleep by Leeds Assessment of

Neuropathic Symptoms and Signs Scale and Sleep Scale from Medical Outcome of Study in experimental and control group.

THROUGHPUT:

According to theory, throughput is the operational phase. It is the process that allows the input to be transformed to the system.

In this study it is the exercises done with the method, Exercises like Foot massage ,Foot rolling exercises, Stretching the calf muscles, Tiptoe exercise, Leg bends, Heel raising, Leg sweeps, Wave your feet, Sitting leg pointers, March exercise given to the patients with diabetic peripheral neuropathy for 30 minutes a day for a period of 15 days in experimental group.

OUTPUT:

According to theory, output is the product of the system which results from the process of throughput.

In this study, it is the assessment of the posttest level of pain by Leeds Assessment of Neuropathic Symptoms and Signs Scale in experimental and control group. The pain level was interpreted as non neuropathic pain, Mild neuropathic pain, Moderate neuropathic pain, Severe neuropathic pain. And the posttest level of sleep by sleep scale from medical outcome of study in experimental and control group. The sleep score was interpreted as Good sleep, Poor sleep, Very poor sleep

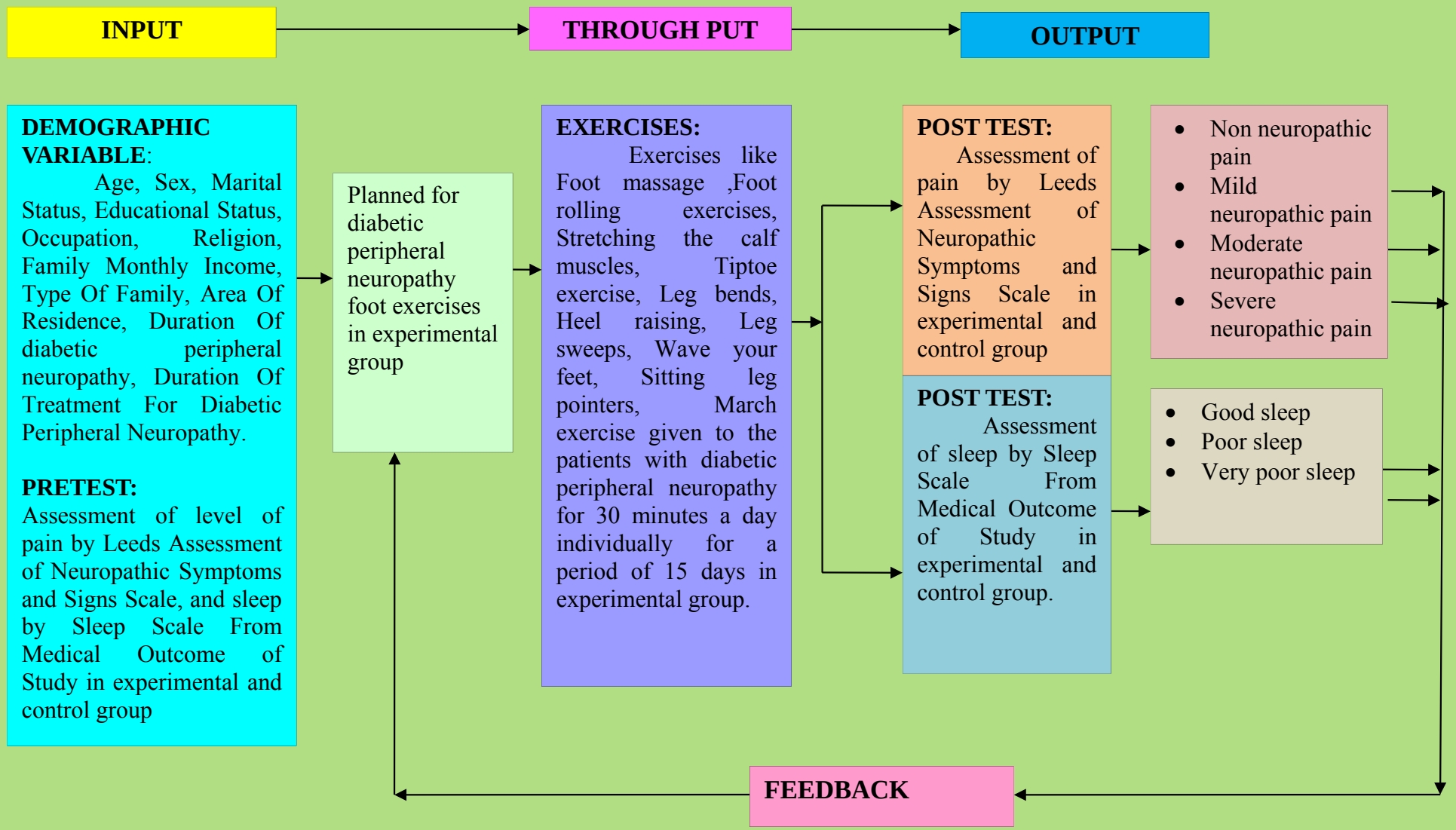


Fig:1 CONCEPTUAL FRAME WORK BASED ON MODIFIED LUDWIG VON BERTLANFFY SYSTEM THEORY(1968)

CHAPTER-II

REVIEW OF LITERATURE

This chapter deals with the related review of literature. The literatures are classified under the following headings:

PART-I

Over view of

F. Diabetic peripheral neuropathy
G. Exercises
H. Pain
I. Sleep

PART-II

Section A : Studies related to incidence and prevalence of diabetic Peripheral neuropathy

Section B : Studies related to pain on diabetic peripheral neuropathy

Section C : Studies related to sleep on diabetic peripheral neuropathy

Section D : Studies related to effectiveness of exercises on pain and sleep among patients with diabetic peripheral neuropathy

Section E : Studies related to nurses role in exercises on pain and sleep among patients with diabetic peripheral neuropathy.

PART-I

a) **DIABETIC PERIPHERAL NEUROPATHY**

INTRODUCTION:

Diabetes can cause a number of problems that creep up slowly. The most common of these is nerve damage in the feet and hands. This kind of nerve damage can lead to different kinds of symptoms, such as numbness or lack of muscle control. But the most common and troublesome problem caused by nerve damage is a burning or tingling pain.

American academy of neurology foundation.,(2011)

DEFINITION:

Diabetic peripheral neuropathy is a non-inflammatory disease process associated with diabetes mellitus and characterized by sensory and/or motor disturbances in the peripheral nervous system. Patients commonly experience degeneration of sensory nerves and pathways.

Medical dictionary., (2013)

INCIDENCE:

About 60%-70% of patients with diabetes have some degree of neuropathy, with neurological complications occurring equally in type 1 and type 2 diabetes. The most common type of neuropathy affecting persons with diabetes is sensory neuropathy. This can lead to the loss of sensation in the lower extremities., and coupled with other factors, this significantly increases the risk for complications that result in a lower limb amputation. More than 60% of nontraumatic amputations in the united states occurs in people with diabetes.

Lewis.,(2007)

ETIOLOGY / RISK FACTORS:

The risk factors are ,

- Have poor blood sugar control
- Have had diabetes a long time
- Have high blood pressure
- Smoke

- Diabetes - this is the most common cause of chronic peripheral neuropathy in Europe. The high blood sugar (glucose) levels in people with poorly controlled diabetes lead to the nerve damage.
- Dietary deficiencies - B12 or folate vitamin deficiencies can cause nerve damage and peripheral neuropathy.

The ends of the longest nerve fibers are usually the first to be damaged by high blood sugar levels. That's why pain is often felt first in the feet, then in the hands—parts of the body farthest from the brain and spinal cord. This type of pain is sometimes called the "stocking-glove" pattern.

Raymen ., et.al., (2008)

TYPES OF NEUROPATHY :

SENSORY NEUROPATHY:

The most common form of sensory neuropathy is distal symmetric neuropathy. Some times referred to as "stocking –glove neuropathy". Loss of sensation , abnormal sensations, pain and paresthesias present. The patient may report a feeling of walking on pillows or numb feet. It cause atropy of the small muscles of the hands feet causing deformity and limiting fine movements.

AUTONOMIC NEUROPATHY:

It can affect nearly all body system and lead to hypoglycemic unawareness , bowel incontinence and diarrhea and urinary retention. Delayed emptying is the complication. Postural hypotention, resting tachycardia, painless myocardial infarction will occur.

Lewis.,(2007)

TYPES OF DIABETIC PERIPHERAL NEUROPATHY:

Acute Peripheral Neuropathy:

- Often abrupt onset and not related to duration of diabetes.
- Can resolve completely.
- Burning foot pain, often worse at night.

- Associated with poor glycaemic control but sometimes initially follows establishing good glycaemic control.
- Examination may be normal apart from hyperaesthesia.

Chronic Peripheral Neuropathy:

- Sensory nerves are affected more than motor.
- Touch, pain and temperature sensation and proprioception in lower limbs in a glove and stocking distribution.
- Loss of ankle jerks and, later knee jerks.
- Hands are only affected in severe long-standing neuropathy.
- Equal prevalence in types 1 and 2.

Classification of diabetic peripheral neuropathy according to the number of nerves affected:

Mononeuropathy:

Where only one nerve is damaged, the term used is mononeuropathy.

Poly neuropathy:

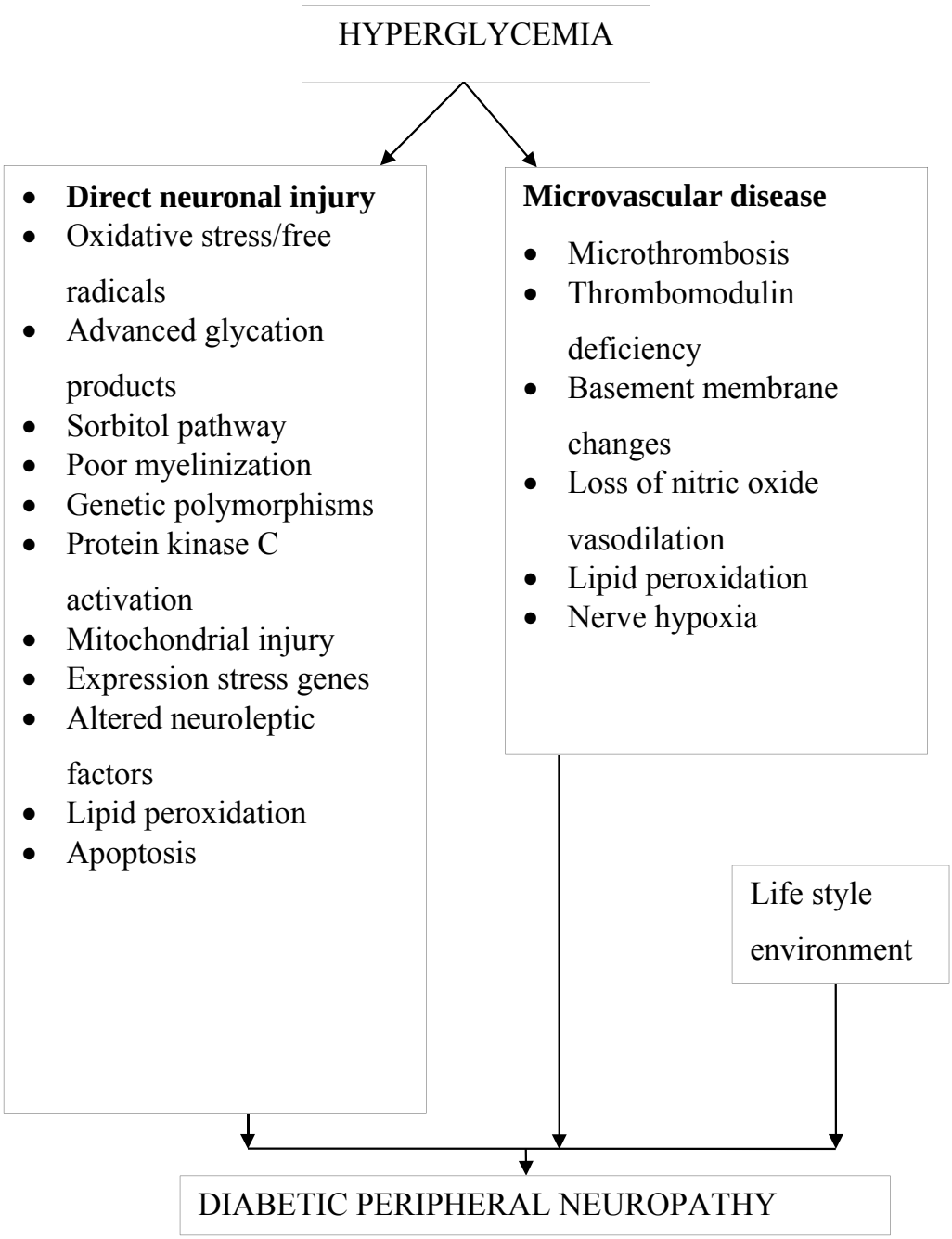
When multiple nerves are damaged, the term used is polyneuropathy.

Webmed.,(2013)

PATHOPHYSIOLOGY:

The pathophysiologic process of diabetic peripheral neuropathy are not

well understood. Several theories exist , including metabolic , vascular and autoimmune elements.



Wedmed.,(2011)

CLINICAL MANIFESTATION:

The pain caused by nerve damage can be more intense than other types

of long term pain. The pain can take many forms, including:

- Tingling
- Burning
- Prickling
- Cramping
- Extreme sensitivity to touch

Diabetic nerve pain is often worse at night. This can disrupt sleep, leading to difficulty with thinking and memory, mood changes, and lower quality of life.

OTHERS

- Complete or partial loss of sensation and temperature
- Foot injury and ulceration
- Hypoglycemic unawareness
- Bowel incontinence
- Diarrhea
- Urinary retention
- Anorexia
- Nausea
- Vomiting
- Gastro esophageal reflex disease
- Fullness feeling
- Postural hypotension
- Resting tachycardia
- Painless myocardial infarction
- Sexual function disturbances
- Erectile dysfunction
- Restless leg syndrome

Jeremy ., (2011)

Definition of restless leg syndrome:

Restless legs syndrome (RLS) is a condition in which patient have an uncontrollable urge to move the legs, usually due to leg discomfort. It typically happens in the evenings or nights while sitting or lying down. Moving eases the unpleasant feeling temporarily. Restless legs syndrome, now known as restless legs syndrome/Willis-Ekbom disease (RLS/WED). It can disrupt sleep leading to daytime drowsiness and make traveling difficult.

Jeremy ., (2011)

Causes of Restless Legs Syndrome:

In most cases, doctors do not know the cause of restless legs syndrome; however, they suspect that genes play a role. Nearly half of people with RLS also have a family member with the condition.

Other factors associated with the development or worsening of restless legs syndrome include:

- **Chronic diseases.** Certain chronic diseases and medical conditions, including iron deficiency, Parkinson's disease, kidney failure, diabetes, and peripheral neuropathy often include symptoms of RLS. Treating these conditions often gives some relief from RLS symptoms.

- **Medications.**Over-the-counter sleeping pills, Antihistamines (found in many cold and allergy pills such as Benadryl, NyQuil, and Dimetapp), Anti-nausea medications (such as Antivert, Compazine, and Dramamine), Calcium channel blockers (used for high blood pressure and heart problems), Antidepressants (such as Prozac, Effexor, and Lexapro), Antipsychotics (used for bipolar disorder and schizophrenia)

- **Pregnancy.** Some women experience RLS during pregnancy, especially in the last trimester. Symptoms usually go away within a month after delivery.
- Other factors, including alcohol use and sleep deprivation, may trigger symptoms or make them worse. Improving sleep or eliminating alcohol use in these cases may relieve symptoms.

Webmed .,(2014)

Symptoms of Restless Legs Syndrome:

People with restless legs syndrome have uncomfortable sensations in their legs (and sometimes arms or other parts of the body) and an irresistible urge to move their legs to relieve the sensations. The condition causes an uncomfortable, "itchy," "pins and needles," or "creepy crawly" feeling in the

legs. The sensations are usually worse at rest, especially when lying or sitting.

The severity of RLS symptoms ranges from mild to intolerable. Symptoms can come and go and severity can also vary. The symptoms are generally worse in the evening and at night and less severe in the morning. For some people, symptoms may cause severe nightly sleep disruption that can significantly impair a person's quality of life.

Webmed., (2014)

Diagnosis of Restless Legs Syndrome:

There is no medical test to diagnose restless legs syndrome; however, doctors may use blood tests and other exams to rule out other conditions. The diagnosis of restless legs syndrome is based on a patient's symptoms and answers to questions concerning family history of similar symptoms, medication use, the presence of other symptoms or medical conditions, or problems with daytime sleepiness.

Neil .et.al., (2013)

Treatment for Restless Legs Syndrome:

Treatment for RLS is targeted at easing symptoms. In people with mild to moderate restless legs syndrome, lifestyle changes, such as beginning a regular exercise program, establishing regular sleep patterns, and eliminating or decreasing the use of caffeine, alcohol, and tobacco, may be helpful. Treatment of an RLS-associated condition also may provide relief of symptoms.

Other non-drug RLS treatments may include:

- Leg massages
- Hot baths or heating pads or ice packs applied to the legs
- Good sleep habits
- A vibrating pad called Relaxis

Medications may be helpful as RLS treatments, but the same drugs are not helpful for everyone. In fact, a drug that relieves symptoms in one person

may worsen them in another. In other cases, a drug that works for a while may lose its effectiveness over time.

Drugs used to treat RLS include:

- Dopaminergic drugs, which act on the neurotransmitter dopamine in the brain. Mirapex, Neupro, and Requip are FDA approved for treatment of moderate to severe RLS. Others, such as levodopa, may also be prescribed.
- Benzodiazepines, a class of sedative medications, may be used to help with sleep, but they can cause daytime drowsiness.
- Narcotic pain relievers may be used for severe pain.
- Anticonvulsants, or antiseizure drugs, such as Tegretol, Lyrica, Neurontin, and Horizant.
- Although there is no cure for restless legs syndrome, current treatments can help control the condition, decrease symptoms, and improve sleep

Webmed .,(2014)

Medications:

Sleep quality is also influenced by certain drugs. The drugs which decrease REM sleep are barbiturates, amphetamines and antidepressants. Short-acting benzodiazepines are used to initiate and maintain sleep. These drugs may act by stimulating an inhibitory neurotransmitter called gamma-amino butyric acid (GABA) and induce the rapid onset of sleep but they suppress deep sleep as well as REM sleep.

Lippincott., (2009)

DIAGNOSTIC STUDIES FOR DIABETIC PERIPHERAL NEUROPATHY:

Diabetic peripheral neuropathy is diagnosed based upon a medical history and physical examination of the feet. During an examination, there may be signs of nerve injury, including:

- Loss of the ability to sense vibration and movement in the toes or feet

(eg, when the toe is moved up or down)(vibrometer assessment)

- Loss of the ability to sense pain, light touch and temperature in the toes or feet
- Loss or reduction of the Achilles tendon reflex
- Michigan neuropathy screening tool

Margeret .,(2010)

GRADING OF DIABETIC PERIPHERAL NEURPATHY:

An alternative approach to estimating severity is to indicate severity by grades. Dyck described the stages of severity:

- Grade 0 = no abnormality of Nerve Conduction,
- Grade 1a = abnormality of Nerve Conduction,
- Grade 1b = Nerve Conduction abnormality of stage 1a plus neurologic signs typical of diabetic neuropathy but without neuropathy symptoms
- Grade 2a = Nerve Conduction abnormality of stage 1a with or without signs (but if present, <2b) and with typical neuropathic symptoms
- Grade 2b = Nerve Conduction abnormality of stage 1a, a moderate degree of weakness (i.e., 50%) of ankle dorsiflexion with or without neuropathy symptoms.

Salomon tesfaye.,(2013)

INSTRUMENTS USED TO DIAGNOSE THE NEUROPATHIC SIGNS AND SYMPTOMS:

Monofilaments-5.07/10gm:

Monofilament 10gm is a sensory testing tool that is used to detect the level of insensate foot. 10gm Monofilament offered by us is designed as per the recommendation of World Health Organization and International Diabetes Federation. This device is ideal for early detection of neuropathy allowing secondary prevention measures to check non-traumatic lower-limb amputation. It is designed to buckle when a 10gm of force is applied to it when it is in contact with the body. (fig: 1)

Fig 1: Monofilament

VIBRATIP:

It is a wipe-clean, pocket-sized device for testing vibration sense. Vibration sense is typically one of the first sensory modalities to be impaired as peripheral neuropathy develops.

Graduated tuning forks (e.g. Reidel-Seiffer) and calibrated electronic devices (e.g. Digital Biothesiometer (Vibrometer) are recommended to quantify the integrity of vibration sensation.

VibraTip is a wipe-clean, disposable, key fob-sized device that provides a constant and reproducible source of vibration. The spherical head facilitates application from any angle and its pocket size means that it is easy to carry and therefore likely to be available at the point of use.

This Validated point of care device for mass screening purpose is vibrating at 128Hz and voltage equivalent of 25Volts of a Biothesiometer.By gently touching the patient's intact skin twice with the rounded tip of VibraTip™, each time for about half a second, explaining that 'this is touch one' and 'this is touch two' whilst randomly activating VibraTip™ on either the first or second touch, a sensitive and specific assessment vibration perception is obtained. (fig:2)

Fig 2: Vibratip

VIBROTEST:

Sensory neuropathy increases the risk of foot ulcerations by seven folds and peripheral arterial disease (PAD) by three folds in people with diabetes. Peripheral neuropathy is the major causal factors in the development of foot ulcerations among diabetic subjects.

Diabetics with neuropathy have seven fold increased risk of foot ulcerations. Diabetics are also exposed to 15 fold higher risk of amputation of lower extremities compared to the general population. Vibration perception has been shown to be strongly associated with foot ulceration. Vibration perception threshold determination by using a Biothesiometer has been used to identify peripheral sensory neuropathy and subjects at risk of foot ulcerations.

The Digital Biothesiometer VIBROTEST is an electronic instrument designed to measure the threshold of appreciation of vibration in human subjects simply and accurately.(fig:3)

Features :

- Full solid state Design
- Digital 0 to 50 Volts output indicator
- Electronic Tuning Fork
- Easy tool to quantify Neuropathy
- Cost effective Biothesiometer
- Weighs less than 3 Kg

Fig 3: Digital Biothesiometer

DIGITAL-BIOTHESIOMETER-VIBROMETER:

Digital Biothesiometer is a non-invasive tool to detect the occurrence of neuropathy. It is an electronic research device that helps in detecting neurological diseases on the threshold of losing or already lost sensation. Biothesiometer Vibrometer is equipped with a turning fork which works electronically and has vibration strength that is slowly increased till a patient can feel the vibratory sensation. This helps to detect the level of loss of sensation in the part of body.

Biothesiometer is digital with the integrated software system, which is compatible with the computer. The software is designed to store the patient data and later print it according to the requirement. The tracking and storage function of the software can be customized as per the need. (fig:4)

Features of Digital Biothesiometer:

- Digital 0 to 50 Volts output indicator
- Electronic Tuning Fork
- Easy tool to quantify Neuropathy
- Full solid state Design
- Interpretation rules can be changed by user
- Modular design makes servicing easy
- Over voltage indicate alarm

- PC enabled
- PC reporting software is simple
- Record Key transfer the data to PC
- Serial RS232/ USB Data transfer facility
- Supplied with padded bag for easy carry
- Weighs less than 3 Kg

Fig 4: Digital Biothesiometer vibrometer

THERMOMETRY-HCP:

An Instrument to assess damage to the small nerve endings, which detect changes in temperature.

Thermometry - HCP offers an accurate measure of warm, cool and heat-pain thermal sensory thresholds, all clinically useful determinants in the evaluation of neuropathic pain, diabetic neuropathy and other small-fiber neuropathies.

Research has shown that diabetic neuropathy affects the peripheral nerves, typically both small and large fibers, though this can be at different time intervals. Quantitative assessment of thermal sensitivity (small-fiber testing) may be of value in the detection of early diabetic neuropathy, even in patients without symptoms or signs of a clinical neuropathy. Since small caliber fibers are affected before large fibers, testing the small fibers helps to detect small fiber diabetic neuropathy two to three years earlier than possible with traditional Electro MyoGraphic tests. (fig:5)

Features:

- Full Solid State design

- Easy tool to quantify Polyneuropathy
- Temperature ranges from 1 to 50 ºC
- Rate of change of temperature 1 ºC per second
- Single probe delivers Cold and Hot sensation
- Patient safety limit beyond range
- Computer compatible
- Storage and patient report from Computer

Fig 5:Thermometry-Hcp

NEUROPATHY-ANALYZER-VIBROTHERM-DX:

Neuropathy Analyzer model Vibrotherm Dx is an excellent tool used to track and measure the loss of vibration and thermal perception in the part of body. Vibrotherm Dx helps in tracking Cool, Warm, Hot and Cold Perception Thresholds and detecting Diabetic Polyneuropathy at an early stage.(fig:6)

- Digital 0 to 50 Volts output indicator for vibration
- Easy tool to quantify Neuropathy
- Full solid state Design Personal Computer enabled
- Offers Glycemic control to diabetic patients
- Non-invasive tool for testing of pain thresholds
- Range: 1˚C to 50˚C (Restricted for the purpose of safety)
- Rate of change: 1˚C per second for Hot/Cold
- Date storage on Personal Computer
- Universal Serial Bus/ Serial Right Selection232 Data Transfer

- Easy operation with hand remote

Fig 6: Neuropathy-Analyzer-Vibrotherm-Dx

CARDIAC-AUTONOMIC-NEUROPATHY-SYSTEM-ANALYZER-CANS-504:

One of our most sought after devices is the Cardiac Autonomic Neuropathy System Analyzer-- CANS 504 which investigates both Sympathetic and Parasympathetic autonomic nervous system response of the patient. The system is provided with ECG Cardio - Tachogram(R-R interval) and innovative automatic NIBP (Non-Invasive Blood Pressure) module to run a succession of Resting ECG, Deep Breathing ECG, Valsalya manoeuvre ECG, BP response to standing ad BP response to hand grip tests. These tests are carried out with patients support and the PC onscreen panel aids in successful operation.(fig(7))

Fig (7): Cardiac-Autonomic-Neuropathy-System-Analyzer-Cans-504

All vibrometer had a total scoring of 30. That is 30 volts. In that <9volts (0-30%) considered as normal. 9-15 (31-50%) consider as mild neuropathy, 16-21 (51-70%) considered as moderate neuropathy and 22-30 considered as severe neuropathy and the patient had a chance of internal infections or problems with there.

MANAGEMENT:

- Tight control of blood sugar levels
- Care for the feet to prevent complications
- Control of pain caused by neuropathy

Control blood sugar levels — One of the most important treatments for diabetic neuropathy is to control blood sugar levels. Symptoms of pain and burning may improve when blood glucose sugar improves.

Eve L. Feldman., (2013)

MEDICAL MANAGEMENT:

- Offer a choice of amitriptyline, duloxetine, gabapentin or pregabalin as initial treatment for neuropathic pain.
- If the initial treatment is not effective or is not tolerated, offer one of the remaining three drugs, and consider switching again if the second and third drugs tried are also not effective or not tolerated.
- Consider tramadol only if acute rescue therapy is needed.
- Consider capsaicin cream for people with localised neuropathic pain who wish to avoid, or who cannot tolerate, oral treatments.
- Opioids other than tramadol should be avoided unless part of shared-care arrangements after specialist assessment.
- Patients on drug treatment should be reviewed early when starting treatment for dosage titration, or when changing dose to monitor for adverse effects and tolerability.
- Regular reviews (National institute for health and care excellence does not specify a time interval) should also be arranged to check progress, adverse effects, mood, quality of sleep and any problems with daily activities.

National institute for health and care excellence., (2014)

OTHER MANAGEMENT:

Non pharmacological Pain Treatments:

A variety of devices and techniques may help relieve diabetic nerve pain. For example, electric nerve stimulators have been shown to work for

some patients. Other methods, such as physical therapy or the use of cold-water treatments, may also be helpful. A device called a bed cradle can keep sheets and blankets from touching sensitive feet and legs.

American academy of neurology foundation., (2011)

Alternative and Complementary Approaches to Pain Relief:

Roughly 40% of Americans have tried alternative or complementary approaches for relieving chronic conditions such as pain. Only a few of these techniques, however, have been scientifically studied for their ability to relieve nerve pain. Studies show that some diabetic leg exercises may help to relieve nerve pain.

American academy of neurology foundation., (2011)

Many people assume that because herbs and other plants are natural, they're safe, but that's not necessarily true. Be cautious before taking any herb, plant, or supplement suggested for diabetic peripheral neuropaty, even if someone the patient know has taken it. It may contain substances that could interfere with medicine the patient do take, and some can lower blood sugar to dangerous levels.

Neither the American Diabetes Association nor the National Center for Complementary and Alternative Medicine (NCCAM) endorses using Complimentary Alternative Medicine treatments in place of traditional treatment. The NCCAM notes that there is not yet enough scientific evidence to suggest complementary medicine will help people with diabetic peripheral neuropathy. Here are some therapies that are being studied. They show potential, but they are a long way from being cleared for use. Those with promise include:

- **Alpha-lipoic acid:**

  This is an antioxidant made by the body. It's also found in organ meats like liver and in dark vegetables like spinach and broccoli. In some

people, it can lower blood sugar and help prevent the nerve damage that often accompanies diabetes.

- **Chromium:**

  Chromium is a trace mineral, meaning one that is needed in small amounts in daily diet. It's found in whole-grain bread and some vegetables. Sold as chromium picolinate, chromium chloride, or chromium nicotinate, it appears to be safe when taken in low doses and for short periods. Some studies show chromium may be safe in doses of 1,000 micrograms a day for up to six years, but doses over that amount could harm the kidneys. Because chromium seems to help glucose metabolism, research is looking at the right amount to help manage diabetes.

- **Polyphenols:**

  These are antioxidants found in green tea and dark chocolate, among many other foods. Scientists are trying to see if polyphenols can lower blood sugar and cholesterol. Although some lab studies had good results, those from studies done on people are mixed.

- **Ginseng:**

  Practitioners have used this herb for centuries for different illnesses, including headaches, fatigue, diabetes, and fever. Some studies have shown that it can reduce blood sugar. But it can also have the same negative effects as drinking too much coffee, causing anxiety, diarrhea, high blood pressure, and sleeplessness.

Some cultures have been using a variety of plants to lower blood sugar for hundreds of years because the plants contain chemicals that can reduce blood sugar. For this reason, diabetes researchers are currently studying botanicals such as fenugreek and milk thistle, a flowering herb from the Mediterranean. Some researchers are also looking at bitter melon, a vine grown

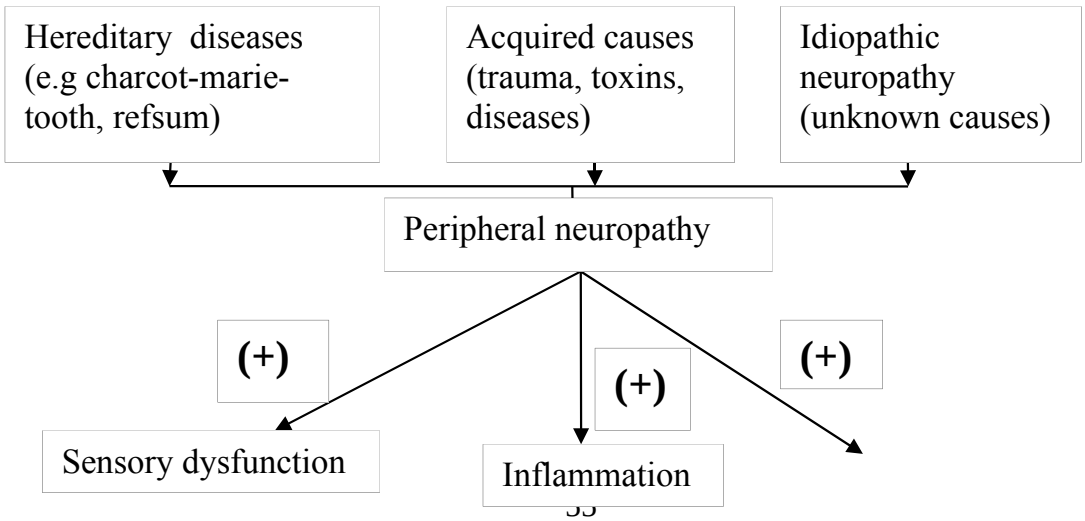
in many Asian gardens. Be careful when using any herb or supplement, because it can affect the way diabetes medications and other medicines work. Talk with the doctor before taking any herbal supplements and don't stop taking the prescribed medications.

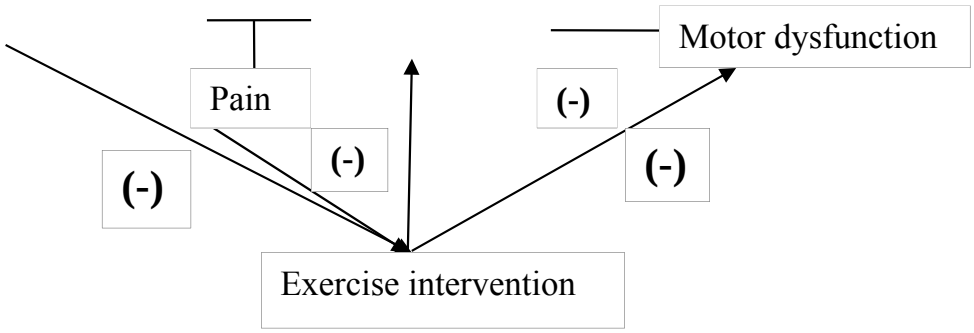
Sohrabi Farrokh., (2014)

Exercise:

Exercise is one natural treatment that does work for diabetic peripheral neuropathy. It can control weight and lower blood sugar and it's free. Just about any exercise is helpful, but particularly foot exercises are easy to work out and prevent from fall, injury and improve peripheral circulation to the feet.

Exercise intervention and peripheral neuropathy relationship:





Here are a few tips before starting a exercise routine:

- **Monitor blood sugar level:** The blood sugar may fall too low when exercise.
- **Get the right gear and shoes for the exercise:** Helps to prevent injury and damage to the foot.
- **Bring water with the patient:** Sip water to avoid dehydration.
- **Take along something to eat:** If blood sugar falls dramatically, the patient may need a quick snack.
- **Watch for injuries, and stop if the patient feel discomfort:** If the patient get an injury, it may take longer for the patient to recover than it would someone without diabetes.
- **Check the feet every day:** The patient may need to be sure that they don't get any blisters or small cuts that could get infected.

Joselin diabetes center harvard medical school., (2013)

NURSING MANAGEMENT:

- ❖ Nurses are health care providers who actively involved in prevention and early detection of diabetes and its complications.
- ❖ The nurses' role could be in health care, health, community education, health systems management, patient care and improving the quality of life.
- ❖ Diabetic peripheral neuropathy nurses play their educating role in the field of prevention of diabetic foot like leg exercises, walking , staircase exercises , foot care and preventing from foot injury, controlling of glucose level.

- ❖ In care dimension, nurses responsible for early detection of any changes in skin and foot sensation, foot care, dressing and apply novel technology.

Berry Judith., (2013)

PREVENTION:

Be guided by the doctor, but general suggestions to reduce the risk of diabetic neuropathy include:

- Maintain blood glucose levels within the target ranges.
- Exercise regularly.
- Maintain a healthy weight for your height.
- Stop smoking.
- Reduce the blood pressure and lipid levels through diet and lifestyle changes, and medication where appropriate
- Consult with the doctor promptly if may have the symptoms including pain, numbness or tingling in your hands or feet.
- Feet checked at least yearly by the doctor, podiatrist or diabetes educator, or more often if have signs of problems with the feet or other complications of diabetes.

Baker IDI heart and diabetes institute.,(2014)

COMPLICATION :

- ➢ Hypoglycemia (due to decreased renal clearance of insulin)
- ➢ Rapidly progressing chronic kidney failure
- ➢ End-stage kidney disease
- ➢ Hyperkalemia
- ➢ Severe hypertension
- ➢ Complications of hemodialysis
- ➢ Coexistence of other diabetes complications
- ➢ Peritonitis (If Peritoneal Dialysis Used)

Milarakis., (2009)

CONCLUSION:

Because the changes are subtle and happen as people get older, people tend to ignore the signs of nerve damage, thinking it's just part of getting older. But the treatments that can help slow the progression of this condition and limit the damage.

Webmed .,(2012)

B)EXERCISES

People with diabetic neuropathy are more likely to develop problems in the legs and feet. Daily exercises and not smoking can help to prevent serious damage.

BENEFITS OF EXERCISES:

Short term and long term benefits:

Life style interventions, including exercises, are the first line in diabetic management. Actually, exercises reduces blood glucose levels via uptake of glucose in to active muscles. Exercises also stimulates glucose transporter type 4 (GLUT4) translocation , enhancing glucose uptake into muscle cells and compensating for impaired insulin sensitivity associated with diabetes. Although both aerobic and resistance exercises offer benefits to the patient with diabetes.

Exercises over the long term reduces low density lipoprotein cholesterol levels and systolic blood pressure in diabetic patients. It also ameliorates symptoms of depression and improves health related quality of life. Given its effects on blood glucose regulation and the role that tight glycemic control plays in preventing diabetic peripheral neuropathy. Exercises should be consider a mainstay of treatment for this complication of diabetes. Simple and functional exercises are remarkably effective and can done by anyone with little or no equipment required.

John whyte ., (2013)

STEP I:

FOOT MASSAGE :

Inspect the feet before start the massage. Looking for discoloration such as bluish purple spots, redness, sores, cracks in the skin, fungus on the toe nails, dark spots, cold areas or anything else that stands out as abnormal. Be sure to look in between the toes and encourage the client to do the same every day. If they cannot reach their feet, have them place in a mirror on the floor to view their feet carefully. Experiment with light pressure while inspecting the feet. This should take about two minutes.

Begin with some light compression, using the whole hand. Spend about one minute on each foot lightly compressing the plantar and dorsal surfaces and all but tissue from the toes to the knee.

STEP II:

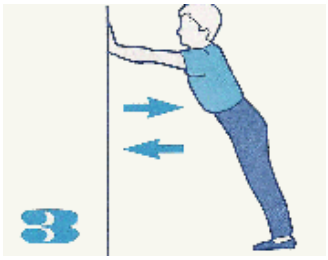
FOOT ROLLING EXERCISES:

Sit in a chair with back straight, knees together. Lift right foot off the floor, place a round thick plastic bottle under the foot. Start to move the bottle front and back. Do this exercise five times. Lower the right foot to the floor and repeat the exercise with left foot.

STEP III:

STRETCHING THE CALF MUSCLES:

Lean with the palms of the hand against a wall. Keep feet some distance away, the heels firmly on the floor. Bend arms 10 times, keeping back and legs straight.



STEP IV:

SITTING LEG POINTERS:

Sit in a chair with back straight, knees together. Lift right foot off the floor, straightening the right knee at the same time. Point the toes into the distance. Holding the leg out straight. Circle the ankle joint clockwise, then counterclockwise five times. Lower the right foot to the floor and repeat the exercise with the left foot.

STEP V

TIPTOE EXERCISE:

Hold to a chair and raise and lower the body on the toes of one foot then the other.

STEP VI:

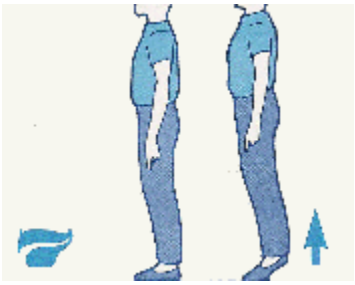
LEG BENDS:

Hold chair. Put one foot forward and lower body straight down, keeping both feet on floor. Raise and lower 10 times. Change legs.

STEP VII:

HEEL RAISING:

Get up on the toes and then down on heels, about 20 times. Also try putting the whole first on one leg and then the other.

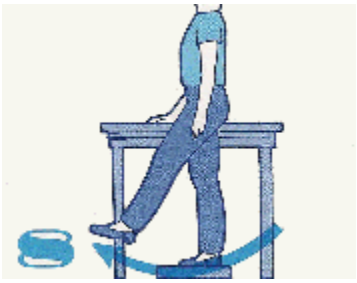


STEP VIII:

LEG SWEEPS:

Stand with one leg slightly raised , on a book for example. While holding to a chair or table swing the other leg back and forth 10 times. Change to the

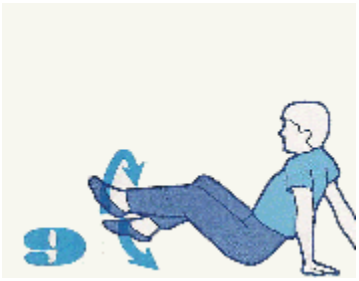
other leg. Repeat it.



STEP IX:

WAVE YOUR FEET:

Sit down on the floor and lean backwards. Shake the feet until they are relaxed and warm.



STEP X:

MARCH EXERCISE:

Stand straight in a place. March in place lifting the knees higher each times.

Webmed.,(2013)

CONCLUSION :

Practicing these exercises are benefit to improving the peripheral circulation to the legs. Thus it will relieve the pain, burning sensation, color changes in the skin, improve the confidence level of the person, reduce anxiety and improve sleep pattern to the diabetic peripheral neuropathy patients.

Webmed., (2012)

C) PAIN

INTRODUCTION :

Acute pain is informative and serves as a warning against impending or current tissue damage, whereas chronic pain is itself a pathological condition that serves no beneficial function. Chronic neuropathic pain is characterized by exaggerated responses to painful stimuli (hyperalgesia), pain resulting from stimuli that would not normally provoke pain (allodynia) and by abnormal pins and needles sensations. The transition from acute pain to chronic neuropathic pain is a highly complicated process that results in dysfunction throughout the pain transmission pathway, from the nociceptors to the dorsal root ganglion and

spinal cord to the thalamus and, finally, the cerebral cortex.

Fischer and Waxman., (2010)

DEFINITION:

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage.

Merskey & Bogduk.,(2007)

DEFINITION OF PERIPHERAL NEUROPATHIC PAIN:

Peripheral neuropathy pain is a result of damage to the peripheral nerves, usually in hands and feet. It can also affect other areas of the body. The patient may experience pricking, cramping or burning pain.

Mayo clinic.,(2013)

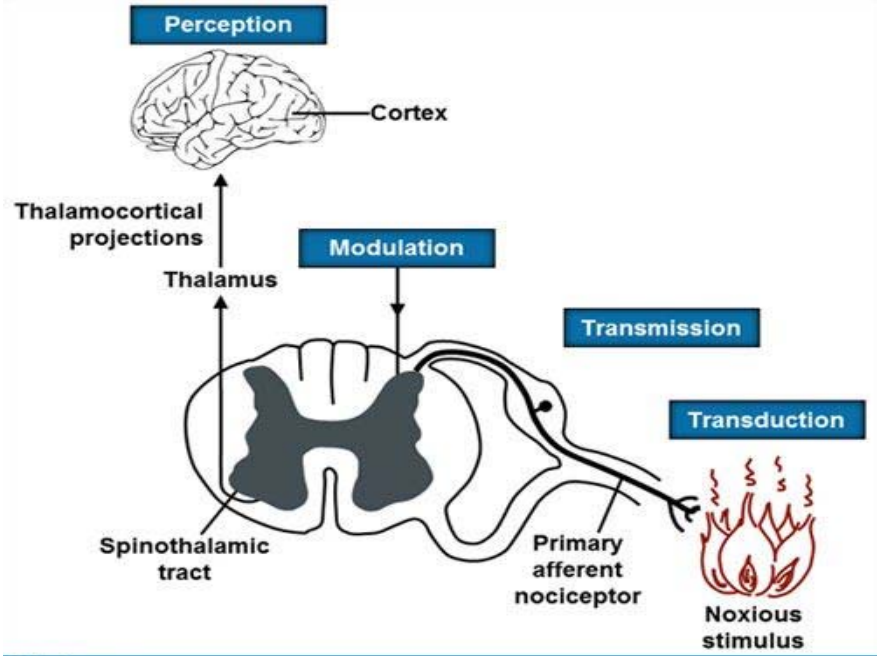
Nature of diabetic peripheral neuropathic pain:

Related to the pain there may also be:

- **Allodynia**. This means that the pain comes on, or gets worse, with a touch or stimulus that would not normally cause pain. For example, or the pressure of the bedclothes may trigger pain in diabetic peripheral neuropathy.
- **Hyperalgesia**. This means that you get severe pain from a stimulus or touch that would normally cause only slight discomfort. For example, a mild prod on the painful area may cause intense pain.
- **Paraesthesia**. This means that get unpleasant or painful feelings even when there is nothing touching, and no stimulus. For example, painful pins and needles, or electric shock-like sensations

Colin tidy., (2014)

PHYSIOLOGY OF PAIN:



Medscape., (2013)

CHARECTERISTICS OF DIABETIC PERIPHERAL NEUROPATHY PAIN:

- The discomfort is usually of a chronic nature and may be described by the patient as a burning sensation, a sharp, stabbing or shooting pain, or 'like an electric shock'.
- Other features may include:
  - Allodynia - seemingly harmless stimuli, such as light touch, provoking pain.
  - Hyperpathia - a short episode of discomfort causing prolonged severe pain.
  - Hyperalgesia - discomfort, which would otherwise be mild, being felt as severe pain. The IASP states that hyperalgesia is a psychophysical term; it is has been suggested as the umbrella term for all conditions of increased pain sensitivity. Its definition parallels that of the physiological term 'sensitisation'

Brufen brunner.,(2013)

LEVELS OF PAIN:

The four levels of pain are as follows:

- Sensory-Motor
- Affective
- Imaginative
- Linguistic Narrative.

DIABETIC PERIPHERAL NEUROPATHIC PAIN ASSESSMENT TOOLS/ SCALES:

- **Douleur Neuropathique en 4 Questions (DN4):** A tool ("the French") using seven interview questions and three physical tests
- **Intra-epidermal nerve fibre (IENF) density:** Measured from punch skin biopsy
- **Leeds Assessment of Neuropathic Symptoms and Signs (LANSS):** A tool ("the British") using five interview questions and two physical tests
- **Laser-evoked potentials (LEPs):** Scalp signals evoked by laser stimuli
- **Nerve Conduction Study (NCS):** The standard electrodiagnostic tool for assessing peripheral nerve fibre function
- **Neuropathic Pain Questionnaire (NPQ):** A tool based on 12 interview questions
- **PainDETECT:** A tool ("the German") based on nine items, including a drawing
- **Quantitative sensory testing (QST):** A method of assessing sensory function with graded stimuli
- **Somatosensory-evoked potentials (SEPs):** Scalp signals evoked by electrical stimuli; the standard electrodiagnostic tool for assessing central somatosensory pathways
- **Standardized Evaluation of Pain (StEP):** A new pain assessment tool that uses six interview questions and ten physical tests

MEDICAL MANAGEMENT:

Medications are used to control the pain associated with peripheral diabetic neuropathy. Unfortunately, at this time, there aren't any medications to treat and prevent diabetic nerve pain (another name for diabetic neuropathy); the only way to do that is through careful control of blood glucose levels. There are many medication options to relieve pain associated with peripheral nerve damage.

Methyl cobalamin:

It is a cobalamine used in diabetic peripheral neuropathy and all types of neuropathy and anemia. It is the form of vitamin B_{12}. This vitamin is one of two active coenzymes used by 5- ethyltetrahydrofolate-homocystine methyltransferase (MTR), also known as methionine synthase.

- **Pharmacokinetics :**

Methyl cobalamin is the neurologically active form of vitamin B_{12} and occurs as a water-soluble vitamin in the body. It is a cofactor in the enzyme methionine synthase, which functions to transfer methyl group for regeneration of methionine from homocystine. In anaemia it increases erythrocyte production by promoting nucleic acid synthesis in the bone marrow and by promoting maturation and division of erythrocytes.

- **Absorption :**

Peak plasma concentrations after 3 hour(oral) 0-9 hour (IM) 3 minutes (IV)

- **Excretion** :

Via urine

- **Adverse reactions** :

Oral: Anorexia, Nausea , Vomiting, Diarrhoea ; **Parenteral :** Rash, Head ache, Hot sensation, Diaphoresis , Pain , Potentially fatal; anaphylactoid reactions: **Others:** Decreased GI tract absorption with neomycin, Aminosalicylic acid, H_2- blockers and colchicines, Reduced effects in anaemia with parenteral chloramphenicol.

- **Dosage:**

Oral for diabetic peripheral neuropathy adult:1500mcg/day in 3 divided dose. Parenteral for diabetic peripheral neuropathy adult: 500 mcg daily IM/IV 3 times/ wk. It can be administer with or without taken food.

- **Storage:**

Store at room temperature. Protect from moisture and light. Parenteral store at room temperature. Do not expose direct to light.

Endocrine web.,(2013)

Medication Warning:

Because of the possible interactions and side effects, always discuss medications with the doctor—even if they're "just" over-the-counter.

Over-the-counter Medications for Diabetic Peripheral Neuropathy

For people in the early stages of diabetic peripheral neuropathy, when the pain isn't severe, over-the-counter medications may be enough to relieve the pain. However, people with more advanced nerve damage may not find over-the-counter medications helpful.

For diabetic peripheral neuropathy, the patient may want to try:

- **Acetaminophen:**

This is a painkiller, also known as an analgesic. Tylenol is an example of acetaminophen, and it works by blocking pain messages to the brain. In essence, acetaminophen makes it harder for the "pain" signal to travel through the nerves and to the brain, and therefore, the brain doesn't know that it should be feeling pain.

Possible side effects include liver damage, but that's after taking large quantities for a long period of time.

- **Non-steroidal anti-inflammatory drugs (NSAIDs):**

NSAIDs have a two-fold effect—they work as painkillers *and* they fight inflammation. They work by blocking the body from creating prostaglandins, which are chemicals that cause inflammation and pain. By taking an NSAID, you prevent your body from making as many prostaglandins, thereby decreasing inflammation and pain. Some common over-the-counter NSAIDs are Advil, Aleve, and Motrin.

Possible side effects include stomach ulcers, diarrhea, nausea, and fatigue.

- **Topical Medication:**

There are several medications available that the patient can apply directly to your skin; these are called topical medications.

One option is capsaicin cream. Capsaicin is what makes chili peppers hot, and it can also relieve the pain. It just temporarily reduces the pain, though, so will need to keep re-applying.

Typically, these topical medications are used by people who have foot pain (common in diabetic peripheral neuropathy).

Prescription Medications for Diabetic Peripheral Neuropathy:

Most people with peripheral diabetic nerve pain need something stronger a prescription medication to treat the pain. It may need a combination of these to deal with the various effects of nerve damage. **The FDA has approved two medications for diabetic peripheral neuropathy**: Cymbalta and Lyrica. Talk with the doctor to find out if these medications may be right for the nerve pain; however, many other medications are commonly used successfully to treat diabetic neuropathy.

Side effects include insomnia, headache, and nausea.

- **Anti-depressants:**

It's not required to be depressed in order to take an anti-depressant. Anti-depressants work by blocking pain messages on their way to the brain, and it's also thought that anti-depressants stimulate the release of endorphins, which are the body's natural painkillers.

There are several types of anti-depressants available to treat diabetic

neuropathy:

- **Tricyclicanti-depressants:**

By raising levels of calming neurotransmitters in your brain, tricyclic anti-depressants can, most importantly, reduce pain. They can also improve mood and help you deal with sleep issues (it can be difficult to sleep when have severe nerve pain).

For diabetic nerve pain, amitriptyline (eg, Elavil, Tryptanol), desipramine (eg, Norpramin and Pertofrane), and imipramine (eg, Antideprin and Deprinol) are commonly prescribed. They're called "first line" medications because they are among the first medications doctors will try to relieve neuropathy because they are usually effective and safe.

Possible side effects include dizziness, drowsiness, dry mouth and eyes, and constipation.

- **Serotonin-norepinephrine reuptake inhibitors (SNRIs):**

Commonly called SNRIs, these anti-depressants increase how much serotonin and norepinephrine you have in your system. They do this by blocking them from being reabsorbed by brain cells; they inhibit their reuptake. With more serotonin and norepinephrine, you should have better mental balance and reduced pain.

Doctors commonly prescribe the SNRI duloxetine (Cymbalta) to treat diabetic neuropathy. It is FDA-approved to treat the pain associated with diabetic neuropathy Side effects include dizziness, drowsiness, and insomnia.

- **Selective serotonin reuptake inhibitors (SSRIs):**

Selective serotonin reuptake inhibitors—abbreviated to SSRI—increase how much serotonin you have. They are different from SNRIs in that they focus on serotonin. SSRIs block serotonin reuptake so that your serotonin level is increased. If you have more serotonin, you have less pain perception.

Some examples of SSRIs are: paroxetine (Paxil) and citalopram (Celexa).

- **Anti-seizures (also called anti-convulsants or anti-epileptics):**

As the name implies, these medications were—and still are—used to treat seizures. They work on diabetic neuropathy by slowing down nerve signals so that the pain message isn't transmitted as effectively.

Some examples of anti-seizures and anti-convulsants are: pregabalin (Lyrica) and gabapentin (Gabarone and Neurontin). Lyrica is FDA-approved to treat diabetic neuropathy.

There are possible side effects to take into consideration: drowsiness, weight gain, dizziness, and nausea.

- **Opioids (Narcotics):**

Opioids, also called narcotics, are very serious, heavy-duty painkillers. They can be used to provide immediate relief for severe pain, but because they can be addictive, you must exercise extreme caution and prudence when using them; use them only under a doctor's careful supervision. Tramadol (Ultram or Ultracet) is an example of an opioid. Oxycodone (OxyContin) is another example that has proven useful in relieving diabetic neuropathy pain.

Possible side effects with opioids include drowsiness, nausea, and constipation.

Topical Medication:

In addition to capsaicin cream, which is available without a prescription, another topical medication is a lidocaine patch. You must have a prescription to use a lidocaine patch. Lidoderm is an example of a lidocaine patch.

ALTERNATIVE TREATMENT:

There are a number of alternative treatments that may help relieve the pain of diabetic peripheral neuropathy, such as:

Capsaicin: This is the chemical that gives hot peppers their bite. When applied to the skin, capsaicin creams (ArthriCare, Zostrix, others) can reduce pain sensations in some people. Side effects may include a burning feeling and skin irritation.

Alpha-lipoic acid. One of the most interesting developments in pain research is the discovery that alpha-lipoic acid, a powerful antioxidant found in food, may be effective at relieving the symptoms of peripheral neuropathy.

Transcutaneous electrical nerve stimulation (TENS). The doctor may prescribe this therapy, which can help prevent pain signals from reaching the brain. TENS delivers tiny electrical impulses to specific nerve pathways through small electrodes placed on the skin. Although safe and painless, TENS doesn't work for everyone or for all types of pain. TENS may be prescribed in addition to other treatments.

Acupuncture. Acupuncture may help relieve the pain of neuropathy, and generally doesn't have any side effects. Keep in mind that patient may not get immediate relief with acupuncture and will likely require more than one session. Traditional Chinese medicine teaches that Peripheral neuropathy is due to dampness moving to the limbs, where it obstructs the flow of energy and Blood within them. The treatment is twofold, to treat the underlying factor that is causing this dampness to accumulate and to directly facilitate the circulation of energy and Blood in the affected area. By improving the circulation, the nerve tissues of the affected area can be nourished to repair the nerve functions and reduce pain. Peripheral neuropathy is a symptom for many different

patterns of disharmony within the body. Oriental Medicine aims to treat each individual uniquely depending on what caused the neuropathy and how it manifests

Biofeedback. This therapy uses a special machine to teach how to control certain body responses that reduce pain. Then learn how to control these same responses themself. Biofeedback techniques are often taught in medical centers and hospitals.

- **Acupressure for diabetic peripheral neuropathy:**

Acupressure may relieve peripheral neuropathy symptoms. Patients with peripheral neuropathy experience chronic pain and tingling, and acupressure may provide some relief. Peripheral Neuropathy results from nerve damage associated with a traumatic accident, infection, metabolic disorder, such as diabetes or exposure to toxins. Acupressure is a type of massage that targets strategic points which may give pain relief. Discuss symptoms with the doctor before trying acupressure, which is not a substitute for medical treatment.

Considerations:

Symptoms of neuropathy frequently affect the hands and feet, and include unusual sensations, such as heat or tingling, over-sensitivity and burning or stabbing pain. Acupressure may help with peripheral neuropathy, most of clinics which recommends massage to improve circulation, and acupuncture to relieve pain. Acupressure stimulates the same points as acupuncture, but uses finger pressure instead of needles. Search the location of an acupressure point until feel a small indentation or tender spot, then apply

steady pressure with the thumb or index finger. Press tender areas gently and avoid causing pain.

Kristin dorman., (2013)

Hot application:

Warmth provides the body with a pleasant, comfortable sensation that might just be enough to provide some relief from neuropathic pain. Can purchase the plug-in heating pad in almost any pharmacy. Many pads have temperature controls to make them adjustable to the needs. Leave the heat on the painful area for a maximum 10 minutes, remove it earlier if it becomes uncomfortable.

If spa like treatment means purchase a paraffin wax warmer. This device is slightly messier and hoter than a heating pad, but using it can feel comfort. Use a candy thermometer to ensure the wax temperature is no higher than 100^0F, and continuous monitoring is needed.

Another method and the least expensive is simply to use warm water. Again make sure the temperature of the water is no higher than 100^0 F.

Ice application:

In general, ice is not as soothing as heat. However, it does have the advantage of being an analgesic. It can provide a mild numbing effect, which can relieve pain. Ice is also anti inflammatory, meaning it helps reduce swelling. This can useful for the feet to reduce pain.

Fill a large freezer bag about half way with ice cubes and seal it. Place a doubled-up towel over the feet, mold the bag of ice to the area and keep it in a place for no more 10 minutes. Different sizes of cold bags – filled with gel or pellets- at a drugstore and keep them in freezer.

Contrast application:

Contrast application are little messy, but it may offer some relief from

pain. Start with two basins: one filled with ice water and other filled with warm water. Starting with the ice water, submerge the feet for 30 seconds if can tolerate and then immediately switch to the warm water for a 2 minutes. Repeat it about 5 times.

Erica K. Jacques., (2014)

Benefits Of Exercise Intervention In Reducing Neuropathic Pain:

Foot exercising to relieve diabetic peripheral neuropathy pain offers benefits for both mind and body. Foot exercise stimulates blood flow, which can help to reduce cramping in affected areas and strengthen nerve tissue. Regular foot exercise increases muscle strength, which prevents muscle wasting and increases stability. In Diabetic Peripheral neuropathy, foot exercises also can help to relieve stress and promote sleep for healthy living.

Rachel nall.,(2013)

CONCLUSION:

The toxic effects of high blood sugar are what cause nerve damage and nerve pain in the first place. Continued high sugar "only lets the process continue "Most people with painful diabetic neuropathy need a combination of both medicines and self-care strategies," But keeping sugars close to normal and regular exercise can stop ongoing damage and decrease the pain of diabetic neuropathy, studies show. And because some diabetic nerve damage might be reversible, reducing sugar may have even more benefits.

Webmed., (2013)

DIABETIC FOOT CARE:

DIABETIC FOOT PROBLEMS:

- Breakdown of the skin of the foot. Sores may develop.
- Damage to blood vessels and impairment of the immune system from diabetes make it difficult to heal these wounds.
- Bacterial infection of the skin, connective tissues, muscles, and bones can then occur.
- People with diabetes must be fully aware of how to prevent foot

problems before they occur, to recognize problems early, and to seek the right treatment when problems do occur. Although treatment for diabetic foot problems has improved, prevention - including good control of blood sugar level - remains the best way to prevent diabetic complications.

Webmed., (2012)

DIABETIC FOOT CARE CAUSES:

Several risk factors increase a person with diabetes chances of developing foot problems and diabetic infections in the legs and feet.

- Poor footwear
- Nerve damage
- Poor circulation
- Trauma to the foot
- Infections
- Smoking

American diabetes association.,(2013)

DIABETIC FOOT CARE SYMPTOMS:

- Persistent pain can be a symptom of sprain, strain, bruise, overuse, improperly fitting shoes, or underlying infection.
- Redness can be a sign of infection, especially when surrounding a wound, or of abnormal rubbing of shoes or socks.
- Swelling of the feet or legs can be a sign of underlying inflammation or infection, improperly fitting shoes, or poor venous circulation.
- Other signs of poor circulation include the following:

✓ Pain in the legs or buttocks that increases with walking but improves with rest (claudication)
✓ Hair no longer growing on the lower legs and feet
✓ Hard shiny skin on the legs

- Localized warmth can be a sign of infection or inflammation, perhaps from wounds that won't heal or that heal slowly.
- Any break in the skin is serious and can result from abnormal wear and tear, injury, or infection. Calluses and corns may be a sign of chronic

trauma to the foot. Toenail fungus, athlete's foot, and ingrown toenails may lead to more serious bacterial infections.

- Drainage of pus from a wound is usually a sign of infection. Persistent bloody drainage is also a sign of a potentially serious foot problem.
- A limp or difficulty walking can be sign of joint problems, serious infection, or improperly fitting shoes.
- Fever or chills in association with a wound on the foot can be a sign of a limb-threatening or life-threatening infection.
- New or lasting numbness in the feet or legs can be a sign of nerve damage from diabetes, which increases a persons risk for leg and foot problems.

Webmed.,(2013)

TIME FOR SEEKING MEDICAL CARE:

- Severe pain in the feet or legs is often a sign of acute loss of circulation to the leg, serious infection, or may be due to severe nerve damage (neuropathy).
- Any cut to the feet or legs that bleeds significantly and goes all the way through the skin needs proper cleaning and repair to aid healing.
- Any significant puncture wounds to the feet (for example, stepping on a nail or being bitten by a dog or cat) carry a high risk of becoming infected.
- Wounds or ulcers that are more than about 1 inch across on the feet or legs are frequently associated with limb-threatening infections.
- Redness or red streaks spreading away from a wound or ulcer on the feet or legs are a sign of infection spreading through the tissues.
- Fever higher than 101.5°F (38.6°C) in association with redness, swelling, warmth, or any wound or ulcer on the legs may be a sign of a limb-threatening or life-threatening infection. If you are a person with diabetes and you simply have a fever more than 101.5°F (38.6°C), and no other symptoms, seek immediate care to determine the source of the fever and to initiate a plan of care. Because the degree of fever does not

always correlate with the seriousness of the illness, people with diabetes should take even low-grade fevers [less than101.5°F (38.6°C)] very seriously and seek medical attention. The patient's doctor may or may not prescribe antibiotics, since fevers are often due to viral infections, which typically do not require antibiotics.

- Alteration in mental status (confusion) may be a sign of life-threatening infection that could lead to loss of a leg or foot, when associated with a leg wound or foot ulcer. Confusion may also be a sign of either very high or very low blood sugars, which are more common when infection is present.

Shahil Rio.,(2012)

EXAMS AND TESTS:

- History and physical examination
- Laboratory tests
- X-rays
- Ultrasound
- Consultation
- Angiogram (if needed**)**

Webmed.,(2012)

MEDICAL TREATMENT:

- Antibiotics
- Referral to wound care center
- Referral to podiatrist or orthopedic surgeon
- Home health care

Webmed., (2013)

SELF-CARE AT HOME:

A person with diabetes should do the following:

- **Foot examination:** Examine the feet daily and also after any trauma, no matter how minor, to the feet. Report any abnormalities to physician. Use a water-based moisturizer every day (but not between your toes) to prevent dry skin and cracking. Wear cotton or wool socks. Avoid elastic socks and hosiery because they may impair circulation.
- **Eliminate obstacles:** Move or remove any items likely to trip over or bump the feet on. Keep clutter on the floor picked up. Light the pathways used at night - indoors and outdoors.
- **Toenail trimming:** Always cut the nails with a safety clipper, never a scissors. Cut them straight across and leave plenty of room out from the nailbed or quick. If the patients have difficulty with the vision or using your hands, let the doctor do it for patient or train a family member how to do it safely.
- **Footwear:** Wear sturdy, comfortable shoes whenever feasible to protect the feet. To be sure the shoes fit properly, see a podiatrist (foot doctor) for fitting recommendations or shop at shoe stores specializing in fitting people with diabetes. The endocrinologist (diabetes specialist) can provide with a referral to a podiatrist or orthopedist who may also be an excellent resource for finding local shoe stores. If the patient have flat feet, bunions, or hammertoes, may need prescription shoes or shoe inserts.
- **Exercise:** Regular leg exercise will improve bone and joint health in the feet and legs, improve circulation to the legs, and will also help to stabilize the blood sugar levels. Consult physician prior to beginning any exercise program.
- **Smoking:** If the patient smoke any form of tobacco, quitting can be one of the best things can do to prevent problems with the feet. Smoking accelerates damage to blood vessels, especially small blood vessels leading to poor circulation, which is a major risk factor for foot infections and ultimately amputations.
- **Diabetes control:** Following a reasonable diet, taking medications, checking blood sugar regularly, exercising regularly, and maintaining good

communication with physician are essential in keeping diabetes under control. Consistent long-term blood sugar control to near normal levels can greatly lower the risk of damage to the nerves, kidneys, eyes, and blood vessels.

American diabetes association.,(2013)

FOLLOW-UP:

- Read any instructions from the doctor while the patient are still in the emergency department or doctor's office. Ask questions about any instructions you don't understand. Follow all of your doctor's or nurse's instructions. Let a doctor know if the patient's condition is not improving within a reasonable time.
- Be sure to finish the entire course of antibiotics if prescribed by the doctor. Not finishing the entire course can lead to bacteria becoming resistant to antibiotics.
- Less pain, swelling, redness, warmth, or drainage are generally all signs of improvement in an infected wound. Shrinkage of the wound or ulcer is a good sign. Absence of fever is also generally a good sign. Generally, some improvement should occur within the first two to three days. Let a doctor know if the patient is not improving as expected.
- Be especially vigilant about the patient's diabetes care while they are healing a foot or leg infection. Good glycemic control is good not only for healing an ulcer the patient already has, but also for preventing future ulcers. Check blood sugar regularly and let a doctor know the pattern of low and high levels.

Webmed.,(2013)

PREVENTION:

Prevention of diabetic foot problems involves a combination of factors.

- Good diabetes control
- Regular leg and foot self-examinations
- Knowledge on how to recognize problems

- Choosing proper footwear
- Regular exercise, if able
- Avoiding injury by keeping footpaths clear
- Having a doctor examine the patient's feet at least once a year using a monofilament, a device made of nylon string that tests sensation.

American diabetes association.,(2013)

CONCLUSION:

All health care providers of people with diabetes should be able to conduct a simple screening exam of the neurological, vascular, dermatological, and musculoskeletal systems. Providers with interest in the foot may choose to obtain additional training and provide focused management of high-risk foot conditions. Additional expertise in patient education, footwear modifications, nail and callus care, and surgical management of the foot may be needed.

American diabetes association., (2014)

D)SLEEP

INTRODUCTION:

One third of human life is spent sleeping. Periods of rest may account for major portion of the life span. Sleep has long been assumed to have a restorative function and recently many people believed sleep to be a passive state of decreased stimulation. . A widely publicized 2003 study performed at the University of Pennsylvania School Of Medicine demonstrated that cognitive performance declines with fewer than eight hours of sleep. However, the purposes of sleep are only partly clear and are the subject of intense research.

Webmed .,(2012)

DEFINITION:

Sleep is a naturally occurring altered state of consciousness characterized by decreases in awareness and responsiveness to stimuli. Sleep is distinguished from abnormal states of consciousness by being readily reversible.

Maharban .,(2012)

PHYSIOLOGY OF SLEEP:

Two systems in brain stem, the reticular activating system and the bulbar synchronizing region are believed to work together to control the cyclic nature of sleep. The reticular formation is found in the brain stem and comprises many nerve cells and fibers. The fibers have connections that relay impulses into the cerebral cortex and into the spinal cord. It facilitates reflex

and voluntary movements as well as cortical activities related to a state of alertness. Wakefulness occurs when the reticular system is activated with stimuli from the cerebral cortex and from periphery sensory organs and cells. The hypothalamus has control centers for several involuntary activities of the body, one of which concerns sleeping and waking. Injury to the hypothalamus may cause a person to sleep for abnormally long periods.

Medscape., (2010)

CIRCADIAN RHYTHMS:

Biological rhythms that follow a cycle of about 24 hours are termed circadian rhythms. The word circadian taken from the Latin words circa means ―about‖ and dies means ―day‖. The sleep-awake cycle is closely linked with other circadian rhythms such as body temperature, gastric acid and hormone secretion. Sleep is one of the body‘s most complex biologic rhythms. Circadian synchronization exists when an individual‘s sleep-wake patterns follow the inner biologic clock. That is, when physiologic and psychological rhythms are high or most active, the person is awake and when these rhythms are low, the person is sleep. Problems of resynchronizations occur when sleep-wake patterns are frequently altered and an individual attempts to sleep during high activity rhythms and to work when the body is physiologically prepared to rest.

Shabeer., (2012)

PHYSIOLOGIC FUNCTION:

The physiology of sleep can be discussed in relation to two basic research approaches, each of which has provided building blocks for developing concepts relating to mechanisms and functions of sleep. The approaches are the electro- physiologic approach and neurotransmitter balance.

ELECTRO- PHYSIOLOGIC APPROACH:

Polygraph recording of electro-physiologic changes in brain waves, eye movements, and muscles show five sleep stages. The first four stages are classified as non-rapid eye movement (NREM) sleep and the other stage is

called REM sleep.

SLEEP CYCLE:

Webmed .,(2013)

NEUROTRANSMITTER BALANCE:

Sleep is an active process involving the reticular activating system (RAS) and a dynamic interaction of neurotransmitters. The RAS consists of a network of interconnecting neurons in the medulla, pones and midbrain with projections to the spinal cord, hypothalamus, cerebellum and cerebral cortex. It is in a strategic location for stimulation from a wide variety of inputs. The RAS includes the ascending facilitators area, which is intrinsically active and a less well understood inhibitory area, which appears to be particularly involved in decreasing muscle tone during REM sleep. As with other parts of the nervous system, communication between neurons in the RAS primarily involves the

release of specific neurotransmitters from axon terminals and their attachment to specific receptors on other cells. Serotonin is a major neurotransmitter associated with sleep. Serotonin is thought to decrease the activity of the RAS, thereby inducing and sustaining sleep. Other neurotransmitters acetylcholine and nor-epinephrine appear to be required for the REM sleep cycle.

Samarba., (2009)

PSYCHOLOGICAL FUNCTION:

Psychological functions of sleep are thought to include the following:-

- **Sorting and discarding of neurophysiologic data.**

Much short-term memory is filled with inconsequential detail that the brain sifts through and discards. A person can usually remember what the person ate for breakfast that day or how long the bus took to come, but a month later those data will probably be beyond recall.

- **Character reinforcement and adaptation**.

The REM stage of sleep appears to be important for mental and emotional stability. Through REM dreaming, a reprocessing of knowledge and memories is thought to occur. An increased need for REM sleep has been found in people experiencing stress, worry, or new learning situations.

The National Sleep Foundation in the United States maintains that seven to nine hours of sleep for adult humans is optimal and that sufficient sleep benefits alertness, memory and problem solving, and overall health, as well as reducing the risk of accidents. A widely publicized 2003 study performed at the University Of Pennsylvania School Of Medicine demonstrated that cognitive performance declines with fewer than eight hours of sleep.

Hours by Age:

Children need a greater amount of sleep per day than adults to develop

and function properly: up to 18 hours for newborn babies, with a declining rate as a child ages. A newborn baby spends almost 9 hours a day in REM-sleep. By the age of five or so, only a bit over two hours is spent in REM.

Age and condition	Average amount of sleep per day
New born	Up to 18 hours
1-12 months	14-18 hours
1-3 years	12-15 hours
3-5 years	11-13 hours
5-12 years	9-11 hours
Adolescents	9-10 hours
Adults, including elderly	7-8 (+) hours
Pregnant women	8(+) hours

Papazoglou.,(2013)

FACTORS AFFECTING SLEEP:

Physical activity:

Activity and exercise influence sleep by increasing fatigue. It appears that physical activity increases both REM and NREM sleep.

Psycho logic stress:

Illness and situations in daily living that cause Psycho logic stress tend to disturb sleep. Generally Psycho logic stress affects sleep in two ways.

1. The person experiencing stress tends to find it difficult to obtain the amount of sleep he or she needs.
2. REM sleep decreases in amount which tends to add to anxiety and stress.

Motivation:

A desire to be wakeful and alert helps overcome sleepiness and sleep. E.g. a tired person may be wakeful and alert when at a party or when attending an interesting play and when there is minimal motivation to be awake, sleep generally follows.

Diet:

It has long been believed that the dietary amino acid L-tryptophan acts to promote sleep. A small protein snack before bed time was frequently recommended for clients with insomnia. Protein may actually increase brain energy alertness and concentration, while carbohydrates appear to have an effect on brain serotonin levels and promote feeling of calmness and relaxation.

Alcohol Intake:

Alcoholic beverages when used in moderation seem to help induce sleep in some people. However, large quantities have been found to limit REM and delta sleep.

Caffeine-containing Beverages:

Caffeine is a central nervous system stimulant. For many people, beverages containing caffeine interfere with the ability to fall asleep e.g. coffee, tea and chocolate etc.

Smoking:

Nicotine has a stimulating effect and smokers usually have a more difficult time falling asleep. They are more easily aroused once asleep and may describe themselves as light sleepers. The total withdrawal from smoking may be associated with sleep disturbances. Clients who stop smoking have an increase in periods of day time sleepiness and report restlessness at night.

Environmental Factors:

Most people sleep best in their usual home environments. Sleeping in a strange or new environment tends to influence both REM AND NREM sleep.

Lifestyle:

Various lifestyles affect the ability to sleep well. Alward and Monk (1995) describe the nurses who work rotating shifts. Sleep disorders are the major problem associated with shift work and developing a sleep pattern is difficult if the shift changes periodically.

Illness:

Illness act as a physiologic and psycho logic stressor, as a result influences sleep. Certain illnesses are more closely related to sleep disturbances e.g. Gastric secretions increases during REM sleep. Many people with peptic ulcers awaken at night with pain and they find that eating a snack to help neutralize stomach acidity is often helpful to relieve discomfort and promote sleep.

Common Sleep Disorders: Primary Sleep Disorders:

Primary sleep disorders are those in which the sleep disturbance is the main symptom or sign of the problem. It includes insomnia, hypersonic, narcolepsy and sleep apnea.

Insomnia:

Insomnia is a perception of inadequate sleep and characterized by difficulty in initiating sleep and frequent awakening from sleep. Insomnia may be classified as idiopathic or psycho physiological. Idiopathic insomnia usually begins in childhood. It may be caused by a neurochemical imbalance of the sleep-onset mechanisms or the sleep-maintenance system. The syndrome is usually associated with a decreased feeling of wellbeing during the day, a deterioration of mood and motivation, decreased attention span, low levels of

energy and concentration and increased fatigue. Psycho physiological insomnia can occur from a variety of causes including stress and tension. Individuals with disorder are usually not sleepy during the day but function poorly in terms of cognitive skills and also report fatigue.

Hypersomnia:

Hypersomnia is a condition characterized by excessive sleep, particularly during the day. Although this may result from medical conditions, it is frequently used as a coping mechanism when someone has no desire or energy to face a new day.

Narcolepsy:

Narcolepsy is a condition characterized by an uncontrollable desire to sleep. The person with narcolepsy can literally fall asleep standing up, while driving a car or while swimming. This disabling condition should not to be confused with hyper somnolence, which is excessive sleeping for long periods. Although the diagnosis of narcolepsy generally requires a multiple sleep latency test and polysomnography.

Sleep Apnea:

Sleep apnea refers to periods of no breathing between snoring intervals. The person may not breathe for periods of 10 to 20 seconds to as long as 2 minutes. Obstructive sleep apnea results when the airway is occluded due to collapse of the hypo pharynx. During long periods of apnea, there is a drop in the oxygen level of the blood, the pulse usually becomes irregular and the blood pressure often increases. The accumulation of carbon dioxide and the fall in oxygen cause brief periods of awakening throughout night.

Parasomnias:

Parasomnias are patterns of waking behavior that appear during sleep. Parasomnias are conditions associated with activities that cause arousal or

partial arousal usually during transitions in NREM periods of sleep. They are not life threatening but they disturb others.

The examples of parasomnias are:-

- Somnambulism: sleep-walking.
- Nocturnal enuresis: bedwetting.
- Sleep-talking.
- Nightmares and night terrors.
- Bruxism: grinding of teeth.

Sleep Deprivation:

Sleep deprivation refers to a decrease in the amount, consistency and quality of sleep. It may result from decreased REM sleep or NREM sleep. The manifestations progress from irritability and impaired mental abilities to a total disintegration of personality. Partial sleep deprivation may result in loss of concentration and pose serious safety risks. The strange environment of the hospital, physical discomfort and pain, the effects of medications and the need for 24 hour nursing care may all contribute to sleep deprivation in the hospitalized client.

Hospital-Acquired Sleep Disturbances:

Clients in the hospital may report difficulty with sleep onset, latency, awakening frequently with difficulty getting back to sleep and early morning awakening.

Sleep Onset Difficulty:

Sleep onset difficulty is a common problem in hospital because of the strange environment and the anxieties associated with illness and

hospitalization. A sleep latency time of 20 to 30 minutes is normal range for most adults.

Sleep Maintenance Disturbances:

Sleep maintenance disturbances may be associated with sustained use of or withdrawal from a variety of medications and related substances. Alcohol hasten sleep onset but leads to awakening later in the night. Other factors that contribute to sleep fragmentation include stimuli that tend to awaken people in the middle of night.

Early Morning Awakening:

Early morning awakening occurs frequently among older clients. Sensitivity to environmental disturbances increases toward morning in people of all ages but even more so in older adults. Clients who are disturbed by early more awakening should be screened for depression. This transient cognitive disorder may e associated with acute illness, infection or admission to the hospital. Sleep is grossly disturbed with frightening dreams, disorientation and restlessness.

Sleep Deprivation:

Sleep deprivation is of particular concern for clients in critical care units. Multiple factors contribute to sleep deprivation including noise level, 24-hour lighting and frequency of caregiver interruptions. Studies have shown noise levels in general surgical wards to be above the World Health Organization‘s guidelines for both day and night shifts.

REM Rebound:

REM sleep occurs later in the sleep cycle and therefore can be missed when sleep time is reduced or interrupted. In order to compensate for missing sleep a greater proportion of REM-deprived clients‘ sleep will be REM. Withdrawal of medications that suppress REM sleep can lead to an REM

rebound effect that is accompanied by nightmares. Normal physiologic occurrences during REM sleep, such as irregular, elevated heart rate and elevated blood pressure may place the REM rebound client at regular risk because of longer amount of time spent in REM.

Lippincott., (2009)

SLEEP ASSESSMENT:

Many people blame inadequate sleep for daytime fatigue or they underestimate the actual time they sleep. Nurses can obtain a more accurate sleep pattern assessment through sleep questionnaires, sleep diaries, polysomnographic evaluation and a multiple latency sleep test. (sleep scale from medical outcome study, sleep likert scale)

Questionnaires:

Several questionnaires have been developed to help to identify sleep patterns. They are either designed to obtain specific information or are unstructured to give the person more freedom to respond. Examples of questions for the client include:

- ❖ When you think about your sleep, what kinds of impressions come to mind?
- ❖ Do you fall asleep at inappropriate times?
- ❖ How long does it take you to fall asleep?
- ❖ Have you been told that you stop breathing while asleep?
- ❖ Do you fall asleep during physical activities?

Questions for the members of the client‟s house-hold are:-

- ♣ Dose the client snore or gasp for air when sleeping?
- ♣ Dose the client kick or thrash around while sleeping?
- ♣ Dose the client sleep-walk?

Sleep Diary:

A sleep diary is a daily account of sleeping and walking activities.

- ❖ The client or personnel compile the information in a sleep disorder clinic.
- ❖ The client notes the times he or she is sleep, describes daily activities, 24 hour log of consumed food and beverages and notes when he or she takes any medications.
- ❖ These self kept diaries generally cover a 2-week period.

Nocturnal Polysomnography:

Nocturnal Polysomnography is a diagnostic assessment technique in which a client is monitored for an entire night‘s sleep to obtain physiologic data. It generally takes place in a sleep disorder clinic but it is now possible to conduct the study at the client‘s home; a technician monitors a computerized recording system up to 60 feet away. The sensors are attached to the head and body record:

- ✓ Brain waves.
- ✓ Eye movements.
- ✓ Muscle tone.
- ✓ Limb movement.
- ✓ Body position.
- ✓ Nasal and oral airflow.
- ✓ Chest and abdominal respiratory effort.
- ✓ Snoring sounds.
- ✓ Oxygen level in the blood.

Multiple Sleep Latency Test:

A multiple sleep latency test is another helpful study.

- ➢ The person undergoing this test is asked to take to a daytime nap at 2-hour intervals while attached to sensors similar to those used in polysomnography.
- ➢ The client is allowed to nap for about 20 minutes.
- ➢ The nap periods are repeated four or five times throughout the day.
- ➢ Clients who have certain sleep disorders causing day time sleepiness have a short latency period- that is they fall asleep in less than 5

minutes.

- Most well-rested persons take an average of 15 minutes before they experience the onset of daytime sleep.

Shabeer., (2012)

TOOLS / SCALES FOR ASSESSING SLEEP PATTERN:

- **Pittsburgh Sleep Quality Index (PSQI) scale:** It has 9 items. For assessing the quality of sleep.
- **Medical Out come of Sleep Scale:** It has 12 items for assessing the sleep pattern.
- **Sleep Quality Scale (SQS).** It helps to assess the quality of sleep. Consisting of 28 items, the SQS evaluates six domains of sleep quality: daytime symptoms, restoration after sleep, problems initiating and maintaining sleep, difficulty waking, and sleep satisfaction.
- **The Epworth Sleepiness Scale (ESS)**; It is a scale intended to measure daytime sleepiness that is measured by use of a very short questionnaire. This can be helpful in diagnosing sleep disorders. It was introduced in 1991 by Dr Murray Johns of Epworth Hospital in Melbourne, Australia.
- **The Insomnia Severity Index (ISI)**: it is designed to be both a brief screening measure of insomnia and an outcomes measure for use in treatment research.
- **Pittsburgh Sleep Diary**: The Pittsburgh Sleep Diary (PSD) is designed to quantify subjectively reported sleep and waking behaviors for use in research and practise.

Eun kim.,(2013)

MANAGEMENT:

Sleep is essential component of well-being. Planning and implementing client care especially in a health care facility, involves planning with the suitable measures to promote sleep. Usually sleep problems are not the primary reason for a client‘s interaction with the health care system. Fundamental to the success of any nursing measure to correct a sleep problem is the client‘s belief that the nurse cares and is readily available for extra help to promote sleep.

Tips for Managing Sleep Disturbances with peripheral Neuropathy

People who sleep poorly are also susceptible to depression and other mood disorders, changes in eating, decrease in physical activity, and an overall decline in health. Compounded with neuropathy, this becomes a vicious cycle.

Improving Daytime Habits and Bedtime Routines to Improve Sleep:

When dealing with neuropathy, you may find yourself thinking your insomnia is the least of your problems. But, the compounding effects of neuropathy and sleep disturbances require that you address both head on. Start by tracking your symptoms and sleep patterns, and then making healthy changes to your daytime habits and bedtime routine (self help techniques):

- ✓ Keep a regular sleep/wake schedule
- ✓ Develop a bedtime ritual (e.g., taking a warm bath, reading light material);
- ✓ Limit or eliminate caffeine four to six hours before bed and minimize daytime
- ✓ Avoid smoking, especially near bedtime or if awake in the night
- ✓ Avoid alcohol and heavy meals before go to bed;
- ✓ Turn off TV, smartphone, iPad, and computer a few hours before bedtime;
- ✓ Adopt relaxation techniques to help induce sleep (e.g., give an extra hour before bed to relax and unwind and time to write down worries and plans for the following day; meditation ; deep breathing exercises); and
- ✓ Create a comfortable sleeping environment (e.g., make sure bedroom is dark, quiet, and well-ventilated; use bed and pillows that are comfortable; elevate the bed sheets so that it is not in direct contact with legs and feet).

Non-pharmacological treatments

These include cognitive behavioral therapy, relaxation techniques, stress management, and acupuncture that can help improve sleep disturbances. They are preferred to prescription sleep medications which can lead to sleepiness during the day, can cause dependency, and come with side effects.

Pharmacological treatments:

These are used as a last resort and should only be used for short periods of time especially when the insomnia is chronic. Sometimes, medicines used to reduce pain or aid sleep can affect your sleep.

Over-the-counter pain medications:

For mild pain, over-the-counter pain medications (e.g., Tylenol, Advil) may suffice. Some over-the-counter pain medications also have an antihistamine to help with sleep (e.g., Advil PM or TylenolPM).

Nurses also need to be alert to the dangers of withdrawal symptoms that can accompany the abrupt cessation of barbiturate sedative-hypnotics.

Medications used to induce sleep may produce day-time drowsiness. The nurse should administer these medications only when indicated and always with full knowledge of their limitations. Thorough client teaching should accompany their use.

Prescription medications:

For more severe or chronic pain, your doctor may recommend prescription pain medications (e.g., ultram, opioids such as oxycodone, hydrocodone bitartrate and acetaminophen, codeine, and morphine). Other drugs can also help with pain, such as some antidepressants and anticonvulsants.

Preparing a Restful Environment:

- ❖ Having a comfortable bed helps promote sleep.
- ❖ The bottom line should be tight and clean and upper linen should allow freedom of movement and should not exert pressure.
- ❖ A quiet and darkened room, with privacy is relaxing for nearly everyone. In a strange environment, unfamiliar noises such as people walking or entering and leaving the room bring complaints from most hospitalized clients.
- ❖ Although some of these sources are difficult for the nurse to control, every effort should be made toward reducing disturbances to promote sleep.
- ❖ The temperature of the room, the amount of ventilation and the quantity of bed covering are matters of individual choice.

Promoting Bedtime Rituals:

- ▪ Most people have bedtime rituals to promote sleep.
- ▪ Reading, listening to the radio, watching television, talking to a family member and praying are common before-sleep activities.
- ▪ Children may search out a favorite doll, stuffed toy or blanket before going to bed; insist on a story. Snacks are important elements in the bedtime rituals of many children and adults.
- ▪ The nurse should be alert to the client‘s bedtime rituals and make every effort to observe them as far as possible to aid in promoting sleep.
- ▪ These rituals should appear in the client‘s plan of care so that all health personnel can observe them.

Offering Appropriate Bedtime Snacks and Beverages:

- ➢ Because carbohydrates seem to help promote sleep, there currently appears to be justification for offering a snack or beverages high in carbohydrates before bed-time.
- ➢ Beverages containing caffeine should be avoided for at least 4 to 5 hours before bedtime.
- ➢ It is best the client take fluids during the day and avoid excessive fluid intake before bedtime to prevent the necessity of using the bathroom during sleeping hours.

Promoting Relaxation:

- One can relax without sleeping, but sleep rarely occurs until one is relaxed.
- Stress and anxiety-producing situations tend to interfere with a person‘s ability to relax and sleep.
- Effective means for dealing with worries include dealing with problems as they arise; conditioning oneself to worry only during preset times; teaching oneself that worrying never solve problems and giving the worries over to another e.g. a trusted family member, friend, caregiver or God. Back rubs, warm baths and face washing if the client is bedridden are typical nursing measures to help the client relax.

Promoting Comfort:

- One of the greatest deterrents to rest and sleep is pain; it is not an uncommon experience when illness is present.
- Depending on the cause and severity of the discomfort or pain, appropriate nursing measures include remaining with a lonely and frightened child or adult, using the simple strategy of caring presence and touch, offering back massage, positioning, mild exercises to relieve signs and symptoms obtaining an extra blanket or administering an analgesic.

Respecting Normal Sleep-Wake Patterns:

- Every effort should be made to observe the client‘s normal periods of sleep.
- It is recommended that a client‘s normal napping habits be followed when possible.
- It has been observed that REM sleep is common during morning naps where as NREM sleep is common during naps later in the day.
- With this knowledge, the nurse can help the client plan napping periods that best fit individual needs and that interfere least with nighttime sleeping.

Scheduling Nursing Care to Avoid Unnecessary Disturbance:

- ✓ Common client complaints are that they are awakened to take sleeping pills and are aroused at early morning hours to prepare for breakfast long before it is served. These common observations should be considered when planning care.
- ✓ Every effort should be made to time care during periods when the client is normally awake.
- ✓ When this cannot be done, it is preferable to avoid awakening the client during REM sleep, when the rapid eye movements can be observed.

Teaching About Rest and Sleep/ nurse's role:

- ➢ A well-informed person is better able to cope with distressing situations.
- ➢ Helping clients and their families understand the nature of rest and sleep and their importance to well being through teaching is an important nursing function.
- ➢ Teaching should include aspects of normal variations in sleep patterns and common measures to promote relaxation and sleep(exercises, music therapy, pleasant environment, proper ventilation).
- ➢ Also the plan of care should be discussed with the client for acceptability.

Webmed .,(2013)

CONCLUSION:

Sleep is an essential part of living—sleep helps us avoid major health problems and it is essential to our mental and physical performance. It affects our mood and stress and anxiety levels. Unfortunately, sleep disturbance or insomnia is often a side effect of the pain. It is a common complaint among people with living with chronic pain. Most experts recommend a range of seven to nine hours of sleep per night for adults, regardless of age or gender. This may seem impossible to people with chronic pain .

The foundation for diabetic peripheral neuropathy.,(2014)

PART –II

SECTION :A

STUDIES RELATED TO INCIDENCE AND PREVALENCE OF DIABETIC PERIPHERAL NEUROPATHY:

Yadav.et.al., (2014) conducted a prospective study regarding the prevalence and risk factors of Diabetic Peripheral Neuropathy in patients with type 2 Diabetes Mellitus patients in Lucknow. 195 consecutive patients over age 30 with a duration of diabetes >6 months were selected. The cases had a

mean age of 47.6 ± 10.2 years (59% males) and duration of symptoms of 5.9±8.2. The overall prevalence of Diabetic Peripheral Neuropathy was 29.2% [95% CI 22.8-35.7]. Peripheral Neuropathy among matched control was 10.7% (95% CI 3.5-17.8). The prevalence of Diabetic Peripheral Neuropathy showed an increasing trend with age (trend chi-square 11.8, P = 0.001). Abnormal vibration perception threshold was present in 43.3% (95% CI 36.3-50.3) of cases and had a significant correlation with Neuropathy Disability Score (P = 0.000). Abnormal monofilament testing was present in 6.1% of cases (95% CI 2.7- 9.5). A logistic regression analysis showed that Diabetic Peripheral Neuropathy was independently associated with age (13.7) (P = 0.002) and duration of diabetic peripheral neuropathy (15.9) (P = 0.02) but not with body mass index, plasma glucose, or HbA1c. The study showed high prevalence of Peripheral Neuropathy in patients with Type 2 Diabetes mellitus, which was independently associated with age and duration of symptoms of diabetes prior to the diagnosis.

Khaldon al sarijin.et.al., (2013) conducted the descriptive study regarding Prevalence of peripheral neuropathy among patients with diabetes mellitus in Cambridge. Convenience sample of 202 patients with Diabetes Mellitus. Data were collected through face-to-face interview. Data collection instrument is composed of two parts; the first part assesses the demographic characteristic, while the second part is a translated version of Michigan Neuropathy Screening Instrument (MNSI). The overall prevalence of diabetic Peripheral Neuropathy was (54.45 ± 49.92). The prevalence of diabetic Peripheral Neuropathy was higher in women than men (55 ± 50 VS 53.92 ± 50.09).

Preeti pavade.et.al., (2013) conducted the cross sectional study on Prevalence and risk factors of diabetic peripheral neuropathy among type-2 diabetic patients in Kulasekharam. Study Period is 10th September- 5th December 2011 & Sample Size is 283. A stratified random sampling and

convenient sampling was used. The patients were questioned and Examined using a Pre-tested Questionnaire followed by a symptomatic history taking and Clinical Examination. In this Study the prevalence of Diabetic-related Neuropathy is 33.33%. The study also shows risk factors for developing neuropathy such as Increasing duration of Diabetes, Comorbid diseases and Low Socio Economic Status.

Caroline A abbott.et.al.,(2011) conducted a observational study regarding Prevalence and Characteristics of Painful Diabetic Neuropathy in a Large Community-Based Diabetic Population in Ipswich. The sample size was 15692. Neuropathic symptom score and neuropathy disability score was used. Prevalence of painful symptoms (NSS $5) and peripheral diabetic neuropathy (NSS $5 and NDS $3) was 34 and 21%, respectively. Painful symptoms occurred in 26% of patients without neuropathy (NDS #2) and 60% of patients with severe neuropathy (NDS .8). Women had 50% increased adjusted risk of painful symptoms compared with men (OR = 1.5 [1.4–1.6], P , 0.0001). Despite less neuropathy in South Asians (14%) than Europeans (22%) and African Caribbeans (21%) (P , 0.0001), painful symptoms were greater in South Asians (38 vs. 34 vs. 32%, P , 0.0001). South Asians without neuropathy maintained a 50% increased risk of painful neuropathy symptoms compared with other ethnic groups (P , 0.0001). One-third of all community-based diabetic patients have painful neuropathy symptoms, regardless of their neuropathic deficit. Painful Diabetic Neuropathy was more prevalent in patients with type 2 diabetes, women, and people of South Asian origin.

Jambart.et.al.,(2010) conducted a study to determine the Prevalence of Painful Diabetic Peripheral Neuropathy among Patients with type I and II Diabetes Mellitus in Jordan. The sample size was 4097 . doluleur neuropathic score was used. The odds of painful diabetic peripheralneuropathy were highest among patients with peripheral vascular disease (OR 4.98), diabetic retinopathy (OR 3.90) and diabetic nephropathy (OR 3.23). Because of the high

prevalence and associated suffering, disability and economic burden of painful Diabetic Peripheral Neuropathy, it is important that diabetic patients are periodically screened, using a simple instrument such as the Doleuar Neuropathic4, and receive appropriate treatment if symptoms develop.

Booya.et.al., (2009) conducted a case control study on potential risk factors for diabetic peripheral neuropathy in America. The sample size was 110. Michigan neuropathy diabetic scoring scale was used for screening and Leeds Assessment of Neuropathic Symptoms and Signs Scale was used for assessing pain. Of the 110 patients, 78% (79) were female and 22% (31) were male. The mean age was 55.1 ± 13.2 (20–80 years). All but one of the patients had type II DM. Mean fasting blood glucose and average duration of disease in the study population were 140.5 ± 8 mg/dl and 12.9 ± 7 years, respectively. Overall prevalence of peripheral neuropathy is 28% of them. The values was significantly associated with age (21.8) [14-19], family income (32.3) [14-22], duration of treatment (23.98) [14-20], height (19.21) [15,22,23], smoking status (27.01) [15,19,24], low HDL cholesterol level (37.91) [15],($p<0.001$). No other association was detected. The results of the study confirm the reports regarding the association of neuropathy with age, family income, duration of treatment, smoking status, low HDL cholesterol level.

Khaled kasim.et.al., (2009) Conducted a cross sectional study to determine the frequency of Peripheral Neuropathy and the risk factors associated with its occurrence in the studied diabetic patients in Egypt. The sample size was 300 patients with type-II. A clinical neurological examination was conducted for all patients using the Michigan Neuropathy Diabetic Scoring (MNDS) criteria for diagnosis of PN. The frequency of PN among the studied subjects was 29.7%. Related risk factors were: older age above 60 years (odds ratio (OR) = 73.0; 95% confidence interval (CI) = 14.2–377.2), associated moderate to severe hypertension (OR = 10.2; 95% CI = 2.8–38.0) and associated ischemic heart disease (IHD) (OR = 3.80; 95% CI = 1.50–9.80),

poor control of DM (OR = 9.1; 95% CI = 2.6–32.1), and duration of Diabetes Mellitus. The risk of PN, however, was significantly reduced among married patients and those reported high educational and family income levels. Diabetic Peripheral Neuropathy is a considerable complication of Diabetes Mellitus. The related risk factors were old age, prolonged and poorly controlled Diabetes Mellitus and associated medical disorders.

Mohsen Janghorbani.et.al.,(2006) conducted a study to estimate the prevalence and risk factors of peripheral neuropathy (PN) in people with type 2 diabetesmellitus in United Kingdom. 810 patients with type 2 diabetes (289 male and 521 female) from Isfahan Endocrinology and Metabolism Research Centre outpatient clinics, Iran , were examined. Part of the examination included an assessment of neurological function including neuropathic symptoms and physical signs, and nerve conduction velocity. The prevalence of PN was 75.1% (95% confidence interval (CI) 72.1, 78.0). The age-adjusted prevalence rate of Peripheral Neuropathy was 78% higher among patients with Ischemic Heart Disease, 64% higher among patients with any retinopathy, 66% higher among insulin-treated type 2 diabetes, and greater with duration of diabetes. Peripheral Neuropathy is a common complication in this population of type 2 diabetic patients. It increases with age, duration of diabetes and proteinuria.

Devies.et.al., (2006) conducted the cross sectional descriptive study regarding The prevalence, severity, and impact of painful diabetic peripheral neuropathy in type 2 diabetes in United Kingdom. The sample size was 1269. Initial screening questionnaire and Toronto Clinical Scoring System was used. In phase 1, there was a 92.7% response (n = 326), with 208 (63.8%) subjects reporting pain. In phase 2, 269 (82.5%) subjects attended and 51 (19.0%) were found to have Painful Diabetic Peripheral Neuropathy. 99 (36.8%) nonneuropathic pain, 20 (7.4%) mixed pain, and 99 (36.8%) no pain (Painful Diabetic Peripheral Neuropathy prevalence 26.4%). Of those with Painful Diabetic Peripheral Neuropathy, 80% stated that their pain was moderate or

severe. Those affected had poorer quality of life than those with no pain (difference in mean scores 3.6 [95% CI 2.5-4.6%]) compared with those with nonneuropathic pain (1.7 [0.4-2.9%]). Both pain and neuropathy score were independently associated with quality of life, and subjects with Painful Diabetic Peripheral Neuropathy had significantly higher neuropathy scores. The study showed a prevalence of Painful Diabetic Peripheral Neuropathy of 26.4%. Having Painful Diabetic Peripheral Neuropathy has a significant negative effect on quality of life, and increasing neuropathy is associated with an increasing risk of developing Painful Diabetic Peripheral Neuropathy.

Agrawal.et.al., (2006) A cross sectional study was conducted to determine the prevalence of microvascular and macrovascular complications in type 2 diabetes and to identify the major risk factors for these complications in Mohit. This cross sectional study was conducted on 4067 patients out of 4400 type 2 diabetic patients attending the diabetic clinic. All patients underwent the specific tests for retinopathy, nephropathy, neuropathy, peripheral vascular diseases (PVD) and cardio-vascular diseases using relevant investigations. The researcher observed evidence of retinopathy in 1176 patients (28.9%), nephropathy in 1323 (32.5%), neuropathy in 1225 (30.1%), Coronary Artery Disease in 780 (19.2%) and Peripheral Vascular Disease in 735 patients (18.1%). This study highlights the high prevalence of various microvascular and macrovascular complications especially nephropathy and neuropathy in Indian population.

Beunza .et.al., (2009) conducted a case control study on association with some risk factors on pain and sleep for diabetic peripheral neuropathy in Africa. The sample size was 110.podiascan was used to assess the severity of the disease and neuropathic symptom score and medical outcome of sleep scale was used to assess the sleeep . Of the 85 patients, 57% were female and 43% were male. The mean age was 47.21 ± 16.4 (30–70 years). All but one of the patients had type II DM. Mean fasting blood glucose and average duration of

disease in the study population were 150.5 ± 2 mg/dl and 15.4 ± 9 years, respectively.The values was significantly didn't associated with age (0.8) [, family income (0.02) , duration of treatment (0.19), residence (1.13), smoking status (1.01), low HDL cholesterol level (0.9), ($p<0.001$). The results of the study confirm the reports regarding the risk factor there was no significant association of neuropathy with age, family income, duration of treatment, smoking status, low HDL cholesterol level.

SECTION: B

STUDIES RELATED TO PAIN ON DIABETIC PERIPHERAL NEUROPATHY PATIENTS:

Sarah L. kerein.et.al., (2012) conducted a study to examine the association between the presence and severity of chronic pain and difficulty with diabetic peripheral neuropathy self-management, adjusting for sociodemographic and other health characteristics including depression in Alexandria. A cross-sectional study of 993 patients with diabetic peripheral neuropathy receiving care through the Department of Veterans Affairs (VA).

Multivariable regression techniques were used. Approximately 60% of respondents reported chronic pain. Patients with chronic pain had poorer diabetic peripheral neuropathy self-management overall (P = 0.002) and more difficulty following a recommended exercise plan (3.0 [95% CI 2.1–4.1]) and eating plan (1.6 [1.2–2.1]). Individuals with severe or very severe pain, compared with mild or moderate, reported significantly poorer diabetic peripheral neuropathy self-management (P = 0.003), including greater difficulty with taking diabetes medications (2.0 [1.2–3.4]) and exercise (2.5 [1.3–5.0]). Chronic pain was prevalent in this cohort of patients with diabetic peripheral neuropathy.

Obrad.W. et.al.,(2012) Conducted a study to determine the effectiveness of diabetic leg exercises on pain and depression among diabetic peripheral neuropathy patients in Sweeden. The sample size was 48. True experimental design was used in this study. The samples receives 35 minutes of leg exercises. And also the patients encouraged to walk 30 minutes per day. The exercises was continue for 2days per week for 4 weeks. The data were collected using Leeds assessment of neuropathic symptoms and signs scale and hospital depression scale. The results showed that experimental group (7.1±2.9pre/4.71±3.4post,p<0.005) has a significant improvement than the control group (9.01±4.9pre/8.53±3.79post (p<0.005) for pain and for the depression experimental group has a significant improvement (5.5±2.3pre/3.7±1.9post(p<0.005) than the control group (7.54±5.2pre/5.98post (p<0.005).

Anil Bhensal.,(2009) conducted a cross sectional study on effectiveness of exercises on pain in Diabetic Peripheral Neuropathy patients in North America. 110 samples were selected for the study. The patients with diabetic peripheral neuropathy with the age group of 40-70 years was selected for the study. Two group exercise group(n=55) and the normal treatment group(n=55). Leeds assessment of neuropathic symptoms and signs scale was

used. It reported that the level of pain scores is significantly lower in the experimental group(2.56±2.01) than the control group (4.50±2.48) at (Independent t=5.101) P=0.011 level of significance. And also it was less in post test (4.31±2.3) than the pre test (7.35±1.32) (t=13.82) at p=0.005 level of significance.

Kevin.et.al ., (2007) conducted a cross sectional study on Treatment of Chronic Painful Diabetic peripheral Neuropathy With exercises in Spain**.** The study was of double-blind, randomized, placebo-controlled, cross-over design. After a 2-week run-in period, 22 diabetic patients were randomized to receive exercises or placebo exercises for 4 weeks. The patients administered the exercises to both feet in morning. Biweekly pain and other sensory symptoms were assessed using a visual analog scale (VAS) and Leeds assessment of neuropathic symptoms and signs scale (LANSS) reduced overall neuropathic pain (P = 0.02) and burning sensation (P = 0.006). At study completion, 11 patients (50%) reported benefit and wished to continue the exercises, 4 (18%) preferred the placebo exercises and the remaining 7 (32%) were undecided. Exercises offers an alternative and effective option in relieving overall pain and burning sensation in the management of painful diabetic peripheral neuropathy.

Joshph S.gimbel.et.al., (2007) conducted a study on leg exercises for pain in diabetic peripheral neuropathy in Jordan. This multicenter, randomized, double-blind, placebo-controlled, parallel-group study included 159 subjects with moderate to severe pain due to diabetic peripheral neuropathy. Treatment began with selected leg exercises (n = 82) or identical placebo (n = 77) every 24 hours. Exercises lasted up to 6 weeks. Overall average daily pain intensity measured by Leeds Assessment of Neuropathic Symptoms and Signs Scale Overall, 80 (96%) of 82 subjects given exercises and 52 (68%) of 77 subjects who received placebo. The pain level was decreased for the exercise group than the placebo group (4.31 and 6.53). In this 6-week trial, leg exercises was

effective for the treatment of moderate to severe pain due to diabetic peripheral neuropathy.

SECTION :C

STUDIES RELATED TO SLEEP AMONG DIABETIC PERIPHERAL NEUROPATHY PATIENTS:

Alexandra .D. et.al.,(2011) conducted a randomized control study on effect of selected leg exercises intervention on sleep in diabetic peripheral neuropathy patients in Brisbane. 45 Sedentary individuals with type 2 diabetes mellitus between ages 45-70 with clinical diagnosis of Diabetic Peripheral Neuropathy were selected in a 3-week, 3 days per week supervised exercise program. The sleep was assessed by using sleep scale from medical outcome of study. Two group were formulated. Exercise group (n=20), Normal treatment

group (n=22). Findings shows that the sleep in exercise group was decreased in pretest (48.1±5.9) and increased in post test (52.09±4..34). But in normal treatment group there is no marked changes of sleep level (34.7±4.9pre/37.65±5.53post). (t=8.89;p<0.001).These preliminary results shows improvement in sleep pattern in people with diabetic peripheral neuropathy following an exercise intervention.

Paul.et.al., [2009] Conducted a study to determine the effectiveness of diabetic leg exercises on sleep among painful diabetic peripheral neuropathy patients in Central America.72 patients with diabetic peripheral neuropathy were selected by randomized control cross over trial and assigned of two groups. First group (n=36) and second group (36). First group receives the exercises 40 minutes 3 days per week for a period of 3 weeks and the second group didn't receive the exercises. The sleep pattern was assessed by the sleep scale from medical outcome of study. The results shows that the first group (56.71±7.43post/ 37.89±5.4pre) has significant improvement than the second group (43.73±4.39 post/ 25.1±4.9 pre) at p= 0.001 level of significance. The results shows that there is reduction in sleep disturbance level for the experimental group.

Livia S . lopes.et.al., (2008) conducted a study on Restless Legs Syndrome and Quality of Sleep in Diabetic peripheral neuropathy in Ceara. The sample size was 100. The sleep was assessed by sleep scale from medical outcomes study. Rest less leg syndrome was found in 27% of patients. Poor sleep quality was present in 45% of cases and was associated with age (P = 0.04), peripheral neuropathy (P = 0.001), and restless leg syndrome (P = 0.000). Excessive day time sleepiness was found in 26% of patients. Logistic regression analysis revealed an association between restless leg syndrome and peripheral neuropathy (12.85 [95% CI 2.83–58.40], P = 0.001). restless leg syndrome is common in type 2 diabetic peripheral neuropathy patients and can be a major cause of sleep disruption in these patients.

Robin L. kruse.,(2008) conducted a cross sectional study on Diabetic peripheral Neuropathy With exercises on anxiety and sleep in Australia. 85 samples were selected for the study. The type-2 diabetes patients with diabetic peripheral neuropathy with the age group of 45-65 years was selected for the study. Two group exercise group(n=43) and the normal treatment group(n=42). It reported that the level of sleep scores by sleep scale from medical outcome of study is significantly higher in the experimental group (73.45±8.73) than the control group (63.75±7.50) at (independent t= 9.8) $p<0.01$ level of significance. And the anxiety scores by hospital anxiety scale is significantly lower in the experimental group (3.23±1.13) than the control group (5.31±2.8) at(independent t=7.51) $p<0.01$ level of significance.

SECTION :D

STUDIES RELATED TO EFFECTIVENESS OF PAIN AND SLEEP AMONG DIADETIC PERIPHERAL NEUROPATHY PATIENTS:

Min yoo.et.al.,(2013) conducted a study on effect of aerobic exercises intervention on painful diabetic peripheral neuropathy in America. Twelve Sedentary individuals with type 2 diabetes mellitus between ages 40-70 with clinical diagnosis of Diabetic Peripheral Neuropathy were enrolled in a 3-week, 3 days per week supervised aerobic exercise program. Brief Pain Inventory-Diabetic Peripheral Neuropathy (BPI-DPN) was used to assess pain intensity (worst, least, average, now) and pain interference with daily life (activity, mood, walk, normal work, relationship, sleep, enjoyment of life) pre and post

the intervention. pre and post the intervention as secondary outcomes of interest 10 of 12 (83.3%) (5 males/5 females; age 57 ± 4.59 years; duration of diabetes 12.2 ± 5.94 years) participants reported pain due to DPN on the BPI-Diabetic Peripheral Neuropathy and were included in the analysis. In these participants, significant reductions in pain interference on walking (4.95±2.83pre/2.8±2.74post,0.0073), sleep (5.05±2.77pre/3.2±3.12 post, P=0.0407) were observed following the interventional. The overall pain interference was also reduced (4.50±2.48pre/2.56±2.01post, P=0.0267). These preliminary results showed reductions in perceived pain interference in people with painful DPN following an exercise intervention.

Huffman C.et.al.,(2012), conducted a randomized, double-blind, placebo-controlled study to evaluated efficacy and safety of exercises for treatment of pain and sleep in patients with painful diabetic peripheral neuropathy (DPN) who experienced pain in diabetic centre from Stamford. Two hundred three patients were treated (exercises n=198; placebo, n=186), with no statistically significant treatment difference for exercises versus placebo, in the co-primary efficacy endpoints, mean Diabetic Peripheral Neuropathy pain (0.0659) and mean Diabetic Peripheral Neuropathy pain on walking (0.4120) and sleep(0.0213). Analysis of co-primary endpoints showed significant treatment difference for Diabetic Peripheral Neuropathy pain (0.0338) and Diabetic Peripheral Neuropathy pain on exercises (0.0011) sleep out come scale (0.4105). . Treatment with exercises resulted in significant improvements versus placebo on prespecified patient global impression of change (0.0020), sleep out come scale (0.0313). The exercises are most effective than the treatment for reducing pain and improve sleep for patients with diabetic peripheral neuropathy.

Nicholas.et.al., (2011) conducted a study to determine the effectiveness of aerobic diabetic leg exercises on pain and depression among diabetic peripheral neuropathy patients in Korea. The sample size was 44. True

experimental design was used in this study. The samples receives 30 minutes of leg exercises. And also the patients encouraged to walk 30 minutes per day. The exercises was continue for 3days per week for 2 weeks. The data were collected using brief pain inventory scale and hospital depression scale. The result shows that experimental group has significant improvement than the control group (5.97±3.75pre/ 4.87±2.74post,p=0.0073), for pain., and for depression (4.50±2.48pre/2.56±2.01post).

Chen.Y.C.et.al., (2009) Conducted a study to determine the effectiveness of aerobic diabetic leg exercises on sleep among painful diabetic peripheral neuropathy patients in China. 32 patients with diabetic peripheral neuropathy were selected by randomized control cross over trial and assigned of two groups. The sleep scale from medical outcome of study was used to assess the sleep pattern. Patient in first group were taught aerobic diabetic leg exercises and practiced daily in home for three weeks. The results were analysed with a variation in the sleep , symptoms of neuropathic pain. Compared to the control group(19.7) (p=0.01, the sleep scores were increased (31.2) (p=0.01) in experimental group indicating that aerobic diabetic leg exercises had a significant effect in sleep. The result reveals that there is reduction in sleep disturbance level for the experimental group.

Jeffrey s. Gonzalez.,(2009) A randomized, placebo-controlled study was conducted to evaluate the effectiveness of exercises for treatment of pain and sleep in patients with diabetic peripheral neuropathy (DPN) who experienced pain in Sismut. 150 patients were selected for the study with purposive sampling and the age group was 40-65 years. The subjects were divided into two groups the exercise group(n=78) and the placebo group(n=72). The results are the pain level was significantly lower in the post test (14.32±5.1pre/7.32±4.1 post‘t value10.91: p<0.01) the sleep score was higher in the post test (37±7.9pre/54.05±6.3post:’t’ value21.13:p<0.01). And the independent value was checked for pain (17.23±1.31placebo/ 10.21±3.7 exercise) (independent‘t’:9.71:p<0.01) and sleep (27.1±8.1placebo/ 52.0±5.3

exercise) (Independent 't' :8.74:p<0.001). And the relationship was find that reported that pain (8.71±3.7) and sleep (53.29±4.3) had a negative relationship (r=(-0.9)., p=0.01) it shows that the exercise was effective in reducing pain and improving sleep pattern and the relationship shows that if the pain level decreased the sleep pattern was improved in diabetic peripheral neuropathy patients.

Swenson.M .et.al., (2006)A cross sectional observational study was conducted on glycaemic control and exercises diabetic complications and their awareness among 200 diabetes patients in Egypt. The subjects were monitored regarding the control of diabetes, examined for micro and macro vascular complications and were interviewed about their awareness and education regarding diabetes and its complications(micro and macro vascular). The result showed that the overall glycaemic control was very poor with 81% having an HbA1c of more than 7%. retinopathy was present in 31%, neuropathy in36% and nephropathy in 24%. It revealed that 31% had diabetic foot problems, while only 38% had awareness or education about diabetes and its complications. The study concluded that along with poor glycaemia control, a high frequency of complications with poor awareness occurs.

SECTION E:-

STUDIES RELATED TO NURSES ROLE IN EXERCISES ON PAIN AND SLEEP AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY:

Amanda boyd.et.al.,(2011) conducted a study on Effects of diabetic leg exercises on pain and sleep, patients with diabetic peripheral neuropathy. Quasi experimental design was used.45 patients fromNew Jersy diabetic clinic were randomly selected and before exercises the pain and sleep level was assessed. The exercises consisted of walking. Foot massage, foot rolling, calf muscle exercises and marching. Significant improvement was shown in on sleep scale from medical outcome of study (n = 40) from 67.1 to 72.4, neurological

symptom score was improved from 5.5(2.3) to 4.3(0.65)(p=0.007),sensory and motor impairment score was improved with 18.8(2.15) to 12.1(1.71) (p=0.003).

Abeer A. Yamany.et.al.,(2011) conducted a randamised control trial to evaluate the effect of low level foot exercises on pain and sleep among diabetic peripheral neuropathy patients in hospital setting in United Kingdom. 30 male and female patients with painful diabetic neuropathy participated in this study. Their ages ranged from 45 to 60 years with a mean of 52.1 ± SD 4.7 years. Patients were randomly assigned into two equal groups of 15, an active foot exercises group(experimental) and a placebo exercises group (control group). The exercises group received foot exercises for 40 minutes per day for a period of 2 weeks). Pain intensity via, Leeds Assessment of Neuropathic Signs And Symptoms Scale, and Sleep Scale from Medical outcome of Study pre- and post for both groups. Pain was significantly decreased from 9.21 to 4.37 ($p < 0.05$) and sleep score were significantly improved from 31.2 to 48.9 ($p < 0.05$) in the exercise group, while no significant change was obtained in the control group. Low level exercises and technique could be an effective therapeutic modality in reducing pain and improving sleep in patients with diabetic peripheral neuropathy.

CHAPTER III

METHODOLOGY

This chapter includes research approach, research design, research setting, population, sample size, criteria for selection of sample, description of the tool, scoring procedure, validity, reliability, pilot study, and method of data collection and plan for data analysis and protecting the human subjects.

RESEARCH APPROACH:

An evaluative approach was used for this study

RESEARCH DESIGN:

The research design was quasi experimental non equivalent pre test and post test control group design which was adopted to assess the effectiveness of exercises on pain and sleep among patients with diabetic peripheral neuropathy.

Schematic representation

GROUP	PRETEST	INTERVENTION	POST TEST
Experimental group	O1	X	O2
Control group	O1	-	O2

O_1- Collection of demographic data, pretest to assess the level of pain and sleep among patients with diabetic peripheral neuropathy in experimental and control group.

X - exercises was given for 30 minutes once in a day for a period of 15 days individually in experimental group

O_2- Post test to assess the level of pain and sleep among patients with diabetic peripheral neuropathy in experimental and control group.

RESEARCH SETTING:

The study was conducted in Saraswathy Ramasamy Changanithi (SRC) diabetes care centre Erode for experimental group and Monika diabetes centre Erode for control group. Saraswathy Ramasamy Changanithi (SRC) diabetes care centre is a 45 bedded diabetic speciality hospital having four floors. The number of average out patients is about 70 per day. In which 26-30 are diagnosed to have diabetic peripheral neuropathy and inpatients cases of diabetic peripheral neuropathy were about 40-45 per month.

The Monika diabetes centre is a 40 bedded diabetic speciality hospital

having 3 floors. The number of average out patients is about 60 per day. In which 25 are diagnosed to have diabetic peripheral neuropathy and inpatients cases of diabetic peripheral neuropathy were about 35-40 per month. The distance between these two hospitals were around 3km.

POPULATION:

The target population selected for the study was patients who were diagnosed with diabetic peripheral neuropathy.

SAMPLE:

Patient with diabetic peripheral neuropathy who were admitted in SRC diabetes care centre, Erode and Monika diabetes centre, Erode.

CRITERIA FOR SELECTION OF SAMPLE:

INCLUSION CRITERIA:

- Patients with age group of 30years and above
- Both male and female patients
- Patients who were admitted in the inpatient department for a minimum stay of 16 days
- Patients who have type 2 diabetes mellitus
- Patients who are willing to participate

EXCLUSION CRITERIA:

- Patients who are critically ill
- Patients who had foot ulcer.

SAMPLE SIZE AND SAMPLING PROCEDURE:

SAMPLE SIZE:

The sample size for the study consists of 60 samples in that 30 were in experimental group and 30 were in control group.

SAMPLING TECHNIQUE:

Non probability purposive sampling technique was used to select the samples for the study. For experimental group 30 samples were selected from

SRC diabetes care centre, Erode and for control group 30 samples were selected from Monika diabetes centre, Erode.

INSTRUMENT AND SCORING PROCEDURE:

INSTRUMENT:

The tool consists of three parts.

PART-I:

It consists of demographic variable such as the age, sex, marital status, educational status, occupation, religion, family monthly income, type of family, area of residence, duration of diabetic peripheral neuropathy, duration of treatment for diabetic peripheral neuropathy.

PART-II;

Leeds Assessment of Neuropathic Symptoms and Signs scale was used to assess the level of pain among patients with diabetic peripheral neuropathy. The tool was adopted from M.I. Bennett (2001). Which consist of 7 dichotomus questions. It was rated as, Yes answer for 1st ,2nd and 6th questions scored as 5marks, 3rd and 7th questions scored as 3marks, 4th question scored as 2marks, 5th question scored as 1mark. No answer scored as '0' mark. The total score was 24.

PART-III:

Sleep scale from medical outcomes study was used to assess the level of sleep among patients with diabetic peripheral neuropathy. This tool was adopted from Hays.R.D., and Stewart.A.L. (1992). Which consist of 12 items 1st question scored as, more than 60 minutes 1 mark, 46-60 minutes 2 mark, 31-45 minutes 3 mark 16-30minutes 4 mark, 0-15 minutes 5 marks and the 2nd question scored as 0-2 hours 1 mark, 3-4 hours 2 marks, 5-6 hours 3 marks, 7-8 hours 4 marks. Question number 3-12 was rated as all of the time-1, most of the time-2, a good bit of the time-3, some of the time-4, a little of the time-5, none of the time-6. Total score was 69.

SCORING PROCEDURE:

Part II:

Leeds Assessment of neuropathic Symptoms and Signs scale was used to assess the pain level of the patient.

The score is interpreted as follows,

Leeds Assessment of Neuropathic Symptoms and Signs scale	**Score**	**Percentage (%)**
Non neuropathic pain	0-12	0-50
Mild neuropathic pain	13-16	51-66
Moderate neuropathic pain	17-20	67-83
Severe neuropathic pain	21-24	84-100

Part III:

Sleep scale from medical outcome of study was used to assess the sleep level of the patient.

The score was interpreted as follows,

Sleep scale from medical outcome of study	**Score**	**Percentage (%)**
Good sleep	51-69	73-100
Poor sleep	32-50	45-72
Very poor sleep	12-31	0-44

VALIDITY AND RELIABILITY OF THE TOOL:

VALIDITY:

The validity of the tool was established in consultation with four nursing experts and one diabetalogist. It was modified according to the suggestions and

recommendation of the experts.

RELIABILITY:

The reliability of the Leeds assessment of neuropathic signs and symptoms scale was established by testing the internal consistency using cronbach's alpha formula was used and found to be reliable (r=0.9). Reliability 0f the sleep scale was established by testing the internal consistency using cronbach's alpha formula was used and found to be reliable(r=0.9).

PILOT STUDY:

Pilot study was conducted in selected diabetic centers in erode. The researcher selected S.R.C diabetic centre and Monika diabetic centre for experimental and control group. The researcher obtained written permission from the institution and oral permission from the participants, prior to the study the purpose of the exercises was explained to the subjects. The pilot study was conducted for a period of 15 days. The data was collected from 10 samples, 5 samples in experimental group and 5 samples in control group. On the first day pre test questionnaire such as Leeds Assessment of Neuropathic Symptoms and Signs scale to assess the level of pain and sleep scale from medical outcome of study to assess the level of sleep was administered. Exercises given to the subjects individually for 15 days in experimental group. Each session lasts for about 30 minutes per day. On the 16^{th} day post test was conducted for the experimental group, where as in control group pre test was conducted on the 1^{st} day and on the 16^{th} day post test was conducted by using same tool.

Findings of the pilot study showed that in experimental group the mean post test scores of level of pain [6.8 (SD±3.11)] was significantly lower than the mean pre test scores of level of pain [19(SD±3.8)]. The paired 't' value was 5.41(table value=2.78) which was significant at $p<0.05$ level. In experimental group the mean post test level of sleep scores [49.4(SD±4.67)] was significantly higher than the mean pretest level of sleep scores [35.2(SD±5.4)]. Paired 't' value was 10.2 (table value=2.78) which was significant at $p<0.05$

level. The mean post test level of pain scores in experimental group [6.8 (SD±3.11)] was significantly lower than the mean post test level of pain scores in control group [17.2(SD±1.3)]. The independent 't' value was 6.91 (table value=2.31) which was significant at $p<0.05$ level. The mean post test level of sleep scores in experimental group [49.4(SD±4.67)] was significantly higher than the mean posttest level of sleep scores in control group [27.8(SD±6.27)]. Independent 't' value was 6.17 (table value=2.31) which was significant at $p<0.05$ level. The pilot study revealed that the study was feasible and practicable to conduct main study.

DATACOLLECTION PROCEDURE:

The main study was conducted in SRC diabetes care centre and Monika diabetes centre Erode. Data collection was done for a period of 5 weeks. The investigator obtained written permission from the hospital. The oral permission was obtained from each participants prior to the study. Based on the inclusion criteria 60 samples were selected by using purposive sampling technique. Every day 2-3 samples were selected for each group.

On 1st day in experimental group data pertaining to the demographic variables was collected by interview and then pre test was conducted to the participants by using Leeds Assessment of Neuropathic Symptoms and Signs scale to assess the level of pain, and sleep scale from medical outcome of study to assess sleep pattern. Exercises was taught to the participants as a single session of 30 minutes per day individually and made them to practice for 15 days. During each session the patients were supervised by the investigator. After the intervention post test was conducted on the 16th day. For control group the demographic variables was collected by interview then the pretest was conducted on the 1st day and on the 16th day post test was conducted by using Leeds Assessment of Neuropathic Symptoms and Signs scale to assess the level of pain and sleep scale from medical outcome of study to assess sleep status. The same procedure was followed for the remaining 30 samples and data were collected. The collected data were analysed by using descriptive and

inferential statistics.

PLAN FOR DATA ANALYSIS

Descriptive and inferential statistics were used for data analysis.

DATA ANALYSIS	METHOD	PURPOSE
Descriptive statistics	Frequency, percentage Mean, Standard deviation	➢ To describe the demographic variables of patients with diabetic peripheral neuropathy ➢ To assess the pre test and post test level of pain among patients with diabetic peripheral neuropathy in experimental group and control group. ➢ To assess the pre test and post test level of sleep among patients with diabetic peripheral neuropathy in experimental group and control group.
Inferential statistics	Paired 't' test	➢ Comparison between the pre test and post test level of pain among patients with diabetic peripheral neuropathy in experimental group. ➢ Comparison between the pre test and post test level of sleep among patients with diabetic peripheral neuropathy in experimental group.
	Independent 't' test	➢ To find the effectiveness of exercises on pain among patients with diabetic peripheral neuropathy between experimental and control group. ➢ To find the effectiveness of exercises on sleep among patients with diabetic peripheral neuropathy between experimental and control group.
	KarlPearson correlation(r)	➢ To find out the relationship between the post test level of pain and sleep in experimental group.
	'Chi square' test	➢ To find the association between the post test level of pain among patients with diabetic peripheral neuropathy with their selected demographic variables in experimental group. ➢ To find the association between the post test level of sleep among patients with diabetic peripheral

		neuropathy with their selected demographic variables in experimental group.

PROTECTING THE HUMAN SUBJECTS:

The research proposal was approved by the dissertation committee prior to the conduction of the study. The written permission was obtained from the managing director of SRC diabetes care centre and Monika diabetes centre. Oral consent was obtained from each sample before starting the data collection and collected data were kept in confidential.

CHAPTER IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of the data collected to assess the effectiveness of exercises on pain and sleep among patients with diabetic peripheral neuropathy in selected diabetic centers, Erode.

ORGANIZATION OF DATA

The data has been tabulated and organized as follows,

SECTION A:

Distribution of demographic variables of patients with diabetic peripheral neuropathy in experimental and control group.

SECTION B:

Assess the pretest and post test level of pain among patients with diabetic peripheral neuropathy in experimental and control group.

SECTION C:

Assess the pretest and post test level of sleep among patients with diabetic peripheral neuropathy in experimental and control group.

SECTION D:

Comparison between the pre test and posttest level of pain among patients with diabetic peripheral neuropathy in experimental and control group.

SECTION E:

Comparison between the pretest and posttest level of sleep among patients with diabetic peripheral neuropathy in experimental and control group.

SECTION F:

Find the effectiveness of exercises on pain among patients with diabetic peripheral neuropathy between experimental and control group.

SECTION G:

Find the effectiveness of exercises on sleep among patients with diabetic peripheral neuropathy between experimental and control group.

SECTION H:

Find the relationship between the posttest level of pain and sleep among patients with diabetic peripheral neuropathy in experimental group.

SECTION I:

Find the association between posttest level of pain among patients with diabetic peripheral neuropathy and their selected demographic variables in

experimental group.

SECTION J :

Find the association between posttest level of sleep among patients with diabetic peripheral neuropathy and their selected demographic variables in experimental group.

SECTION A: DISTRIBUTION OF DEMOGRAPHIC VARIABLES OF PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY IN EXPERIMENTAL AND CONTROL GROUP.

TABLE I: Frequency and percentage distribution of demographic variables among patients with diabetic peripheral neuropathy in experimental and control group:

n_1=30; n_2=30

S. NO	DEMOGRAPHIC VARIABLES	Experimental Group		Control Group	
		F	%	F	%
1	**Age in years**				
	a) 30-40 years	6	20	4	13.3
	b) 41-50 years	12	40	14	46.7
	c) 51-55 years	7	23.3	7	23.3
	d) Above 55 years	5	16.7	5	16.7

2	**Sex**				
	a) Male	18	60	16	53.3
	b) Female	12	40	14	46.7
3	**Marital status**				
	a) Married	27	90	30	100
	b) Unmarried	-	-	-	-
	c) Others	3	10	-	-
4	**Educational status**				
	a) No formal education	7	23.3	7	23.3
	b) Primary education	11	36.7	12	40
	c) Higher secondary education	7	23.3	10	33.3
	d) Graduate	5	16.7	1	3.4

S. NO	**DEMOGRAPHIC VARIABLES**	**EXPERIMENTAL GROUP**		**CONTROL GROUP**	
		F	**%**	**F**	**%**
5	**Religion**				
	a) Hindu	17	56.7	16	53.3
	b) Muslim	5	16.7	3	10
	c) Christian	8	26.6	11	36.7
	d) Others	-	-	-	-
6	**Occupation**				
	a) Coolie	10	33.3	10	33.3
	b) Private employee	7	23.3	5	16.7
	c) Government employee	5	16.7	8	26.7
	d) Self employee	8	26.7	7	23.3
7	**Family monthly income**				
	a) Rs.2000-4000	4	13.4	9	30
	b) Rs.4001-6000	10	33.3	7	23.3
	c) Rs.6001-8000	10	33.3	8	26.7
	d) Above Rs.8001	6	20	6	20

8	**Type of family**				
	a) Nuclear family	22	73.3	22	73.3
	b) Joint family	8	26.7	8	26.7
9	**Area of residence**				
	a) Urban	16	53.3	15	50
	b) Rural	14	46.7	15	50
10	**Duration of diabetic peripheral neuropathy**				
	a) 1-3 years	20	66.7	11	36.7
	b) 3-5 years	8	26.7	6	20
	c) >5 years	2	6.6	13	43.3

S. NO	**DEMOGRAPHIC VARIABLES**	**EXPERIMENTAL GROUP**		**CONTROL GROUP**	
		F	**%**	**F**	**%**
11	**Duration of treatment for diabetic peripheral neuropathy**				
	a) 1-3 years	28	93.3	13	43.3
	b) 3-5 years	1	3.3	12	40
	c) >5 years	1	3.4	5	16.7

Table 1 showed that Regarding age in experimental group, majority12(40%) belonged to the age group of 41-50 years,7(23.3%) belonged to 51-55 years, 6(20%) belonged to 30-40 years and remaining 5(16.7%) belonged to above 55 years. In control group majority 14(46.7%) belonged to 41-50 years, 7(23.3%) belonged to 51-55 years, 5(16.7%) belonged to above 55 years and remaining 4 (13.3%) belonged to 30-40 years**.(fig:2)**

Regarding to sex, in experimental group, 18(60%) were males and 12(40%) were females. In control group, 16(53.3%) were males and 14(46.7%) were females. **(fig:3)**

Regarding marital status in experimental group 27(90%) were married

and 3(10%) were widow. In control group 30(100%) were married**.(fig:4)**

Regarding educational status in experimental group, majority of the patients 11(36.7%) had primary education, 7(23.3%) had no formal education and 7(23.3%) had higher secondary education and 5 (16.7%) were graduates. In control group, majority of the patients 12(40%) had primary education and 10(33.3%) had higher secondary education,7(23.3%) had no formal education, and 1(3.4%) were graduates **.(fig:5)**

Regarding religion in experimental group, majority 17(56.7%) belonged to Hindu religion, 8(26.6%) belonged to Christian religion and 5(16.7%) belonged to Muslim religion. In control group majority 16(53.3%) belonged to Hindu religion, 11(36.7%) belonged to Christian religion, and 3(10%) belonged to Muslim religion. **(fig:6)**

Regarding occupation in experimental group, majority 10(33.3%) were coolie workers, 8(26.7%) were self employee, 7(23.3%) were private employee and 5(16.7%) was government employee. In control group majority 10(33.3%) were coolie workers, 8(26.7%) were government employee ,7(23,3%) were self employee,5(1316.7%) were private employee**.(fig:7)**

Regarding family monthly income, in experimental group majority 10(33.3%) were in between Rs 4001-Rs.6000, 10(33.3%) were in between Rs 6001-Rs.8000, 6 (20%) were in between above Rs.8001 and 4 (13.4%) were Rs.2000-Rs.4000. In control group majority 9(30%) were in between Rs 2000-Rs.4000, 8(26.7%) were in between Rs 6001-Rs.8000, 7 (23.3%) were Rs.4001-Rs.6000 and 6(20%) were above Rs.8001. **(fig:8)**

Regarding type of family in experimental group 22 (73.3%) were from nuclear family and 8(26.7%) were from joint family. In control group the patients 22(73.3%) were from nuclear family and 8(26.7%) were from joint

family**.(fig:9)**

Regarding area of residence in experimental group, majority 16(53.3%) were in urban area and 14(46.7%) were in rural area. In control group majority15(50%) were in urban area and 15(50%) were in rural area**. (fig:10)**

Regarding duration of diabetic peripheral neuropathy, in experimental group 20(66.7%) had duration of illness for 1-3 years, 8(26.7%) had duration of 3-5 years and 2(6.6%) had above 5 years. In control group majority 13(43.4%) had above 5 years, 11(36.7%) had the illness for 1- 3 years had, 6(20%) had duration of illness for 3-5 years. **(fig:11)**

Regarding duration of treatment, in experimental group 28(93.3%) had duration of treatment for a period of 1-3year ,1(3.3%) had duration of treatment for a period of 3-5 years,1(3.4%) had a duration of treatment for a period of above 5 years,. In control group majority 13(43.3%) had duration of treatment for a period of 1-3 years, 12(40%) had duration of treatment for a period of 3-5 years, 5(16.7%) had duration of treatment for a period of above 5 years**.(fig12)**

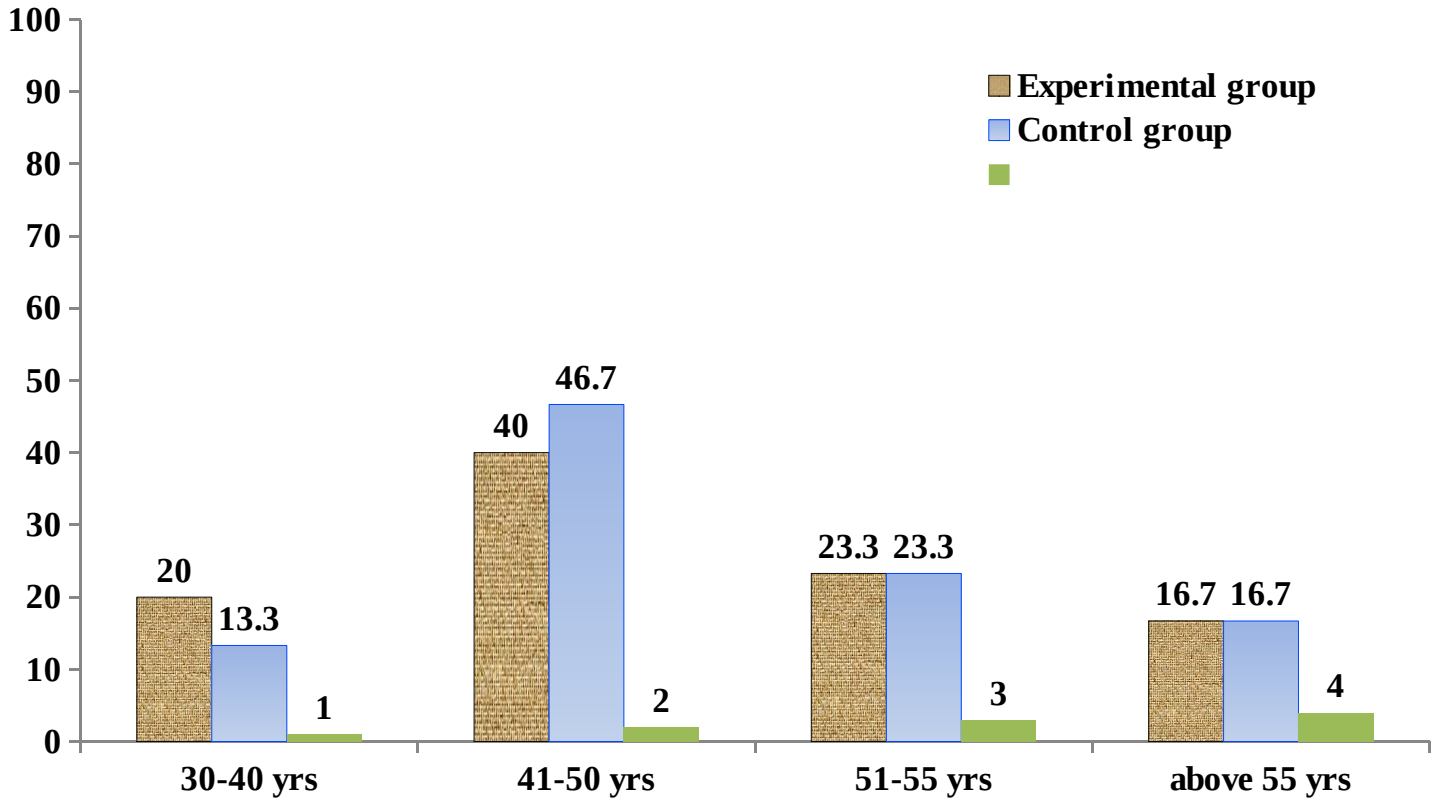


Figure 2: Percentage distribution of patients with diabetic peripheral neuropathy according to their age in years in experimental and control group.

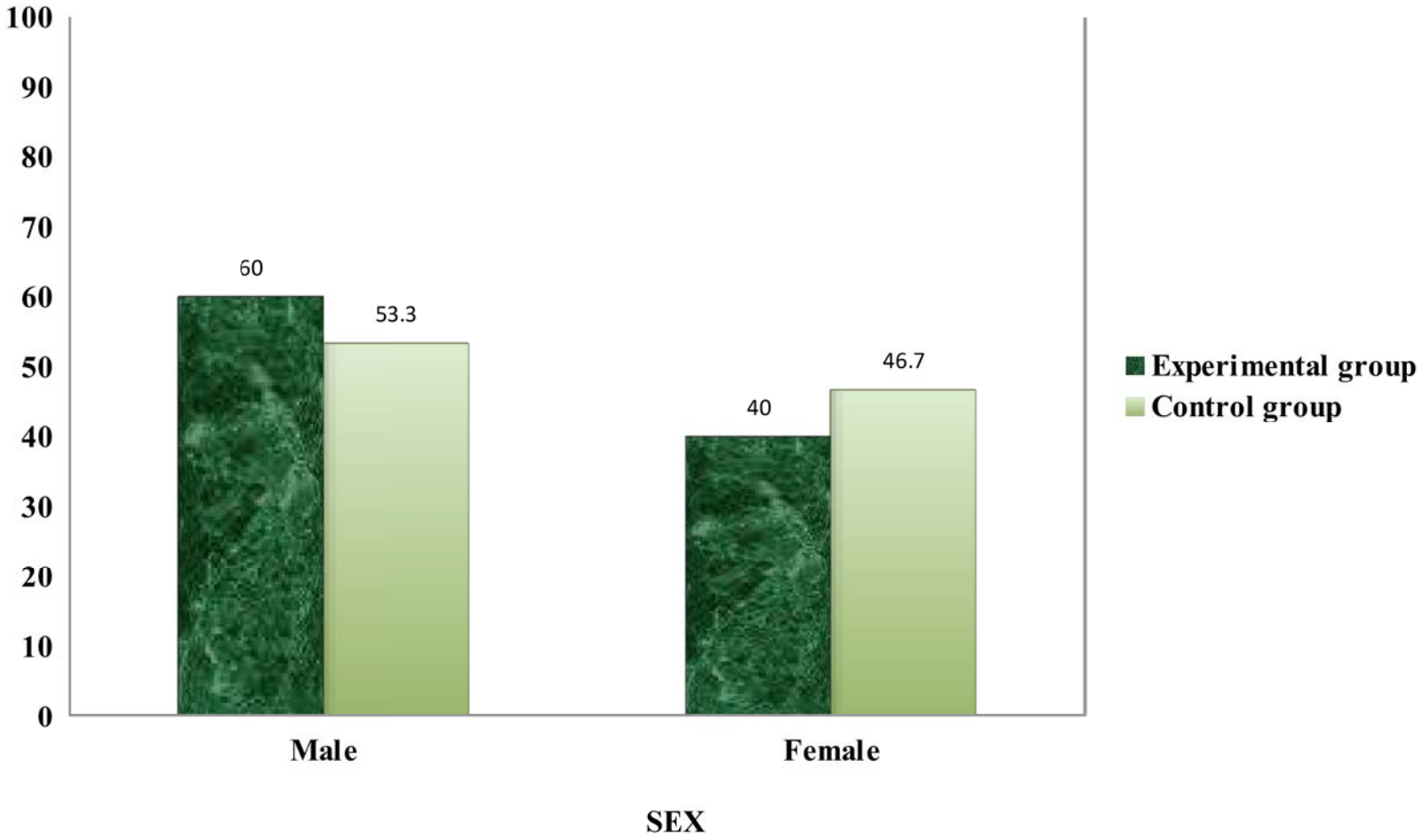


Figure 3: Percentage distribution of patients with diabetic peripheral neuropathy according to their sex in experimental and control group.

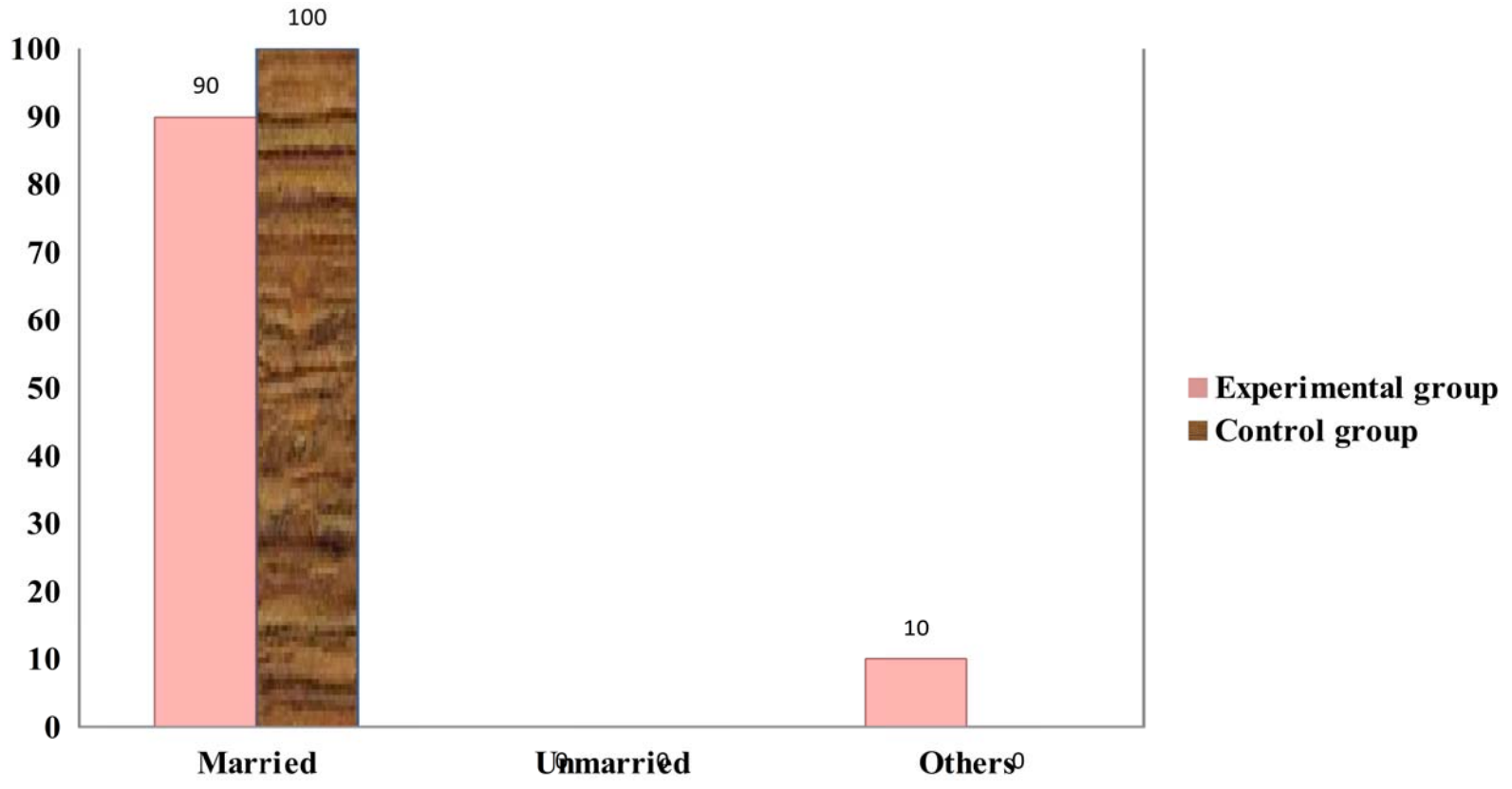


Figure 4: Percentage distribution of patients with diabetic peripheral neuropathy according to their marital status in experimental and control group.

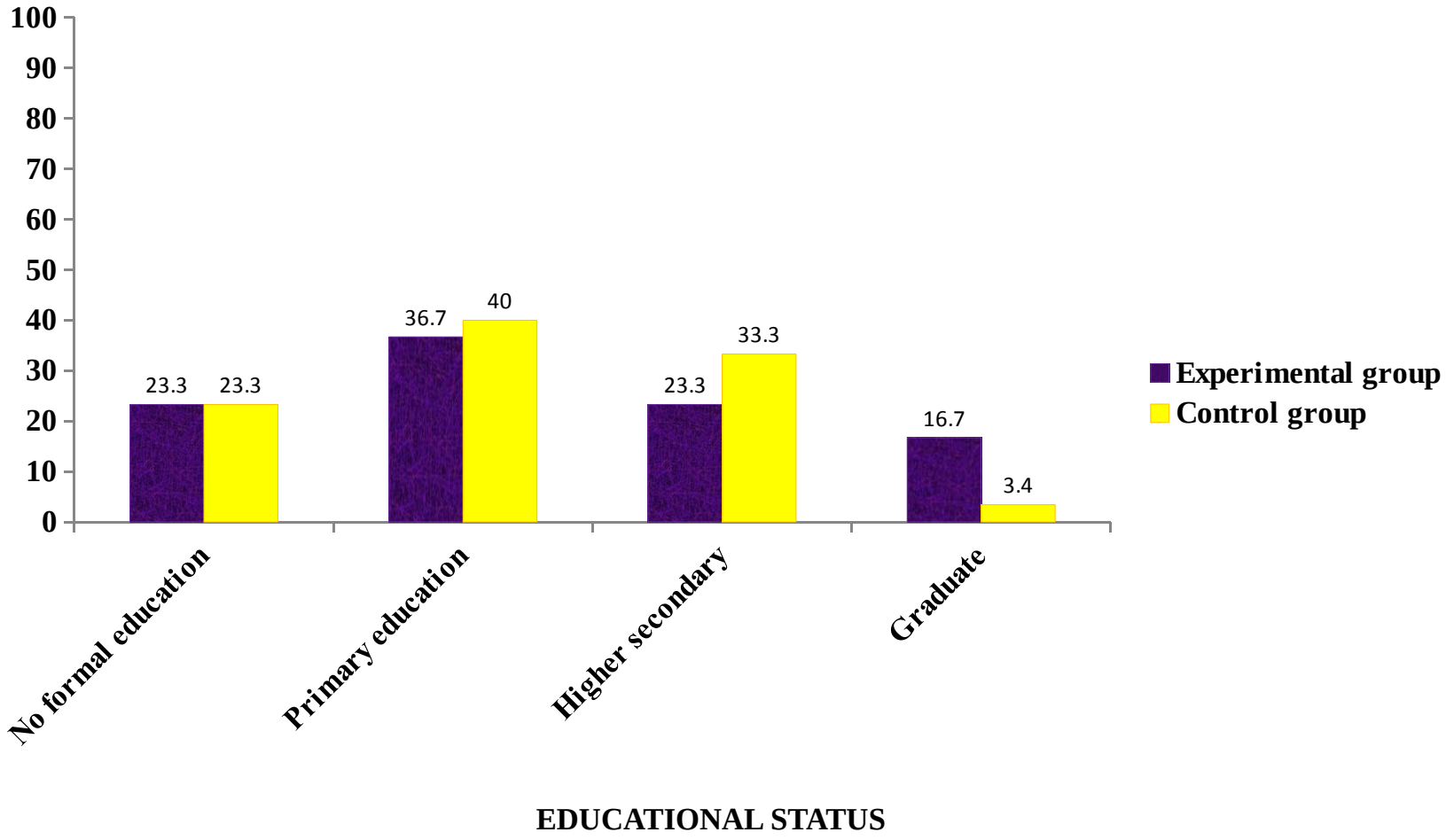


Figure 5: Percentage distribution of patients with diabetic peripheral neuropathy according to their educational satus in experimental and control group.

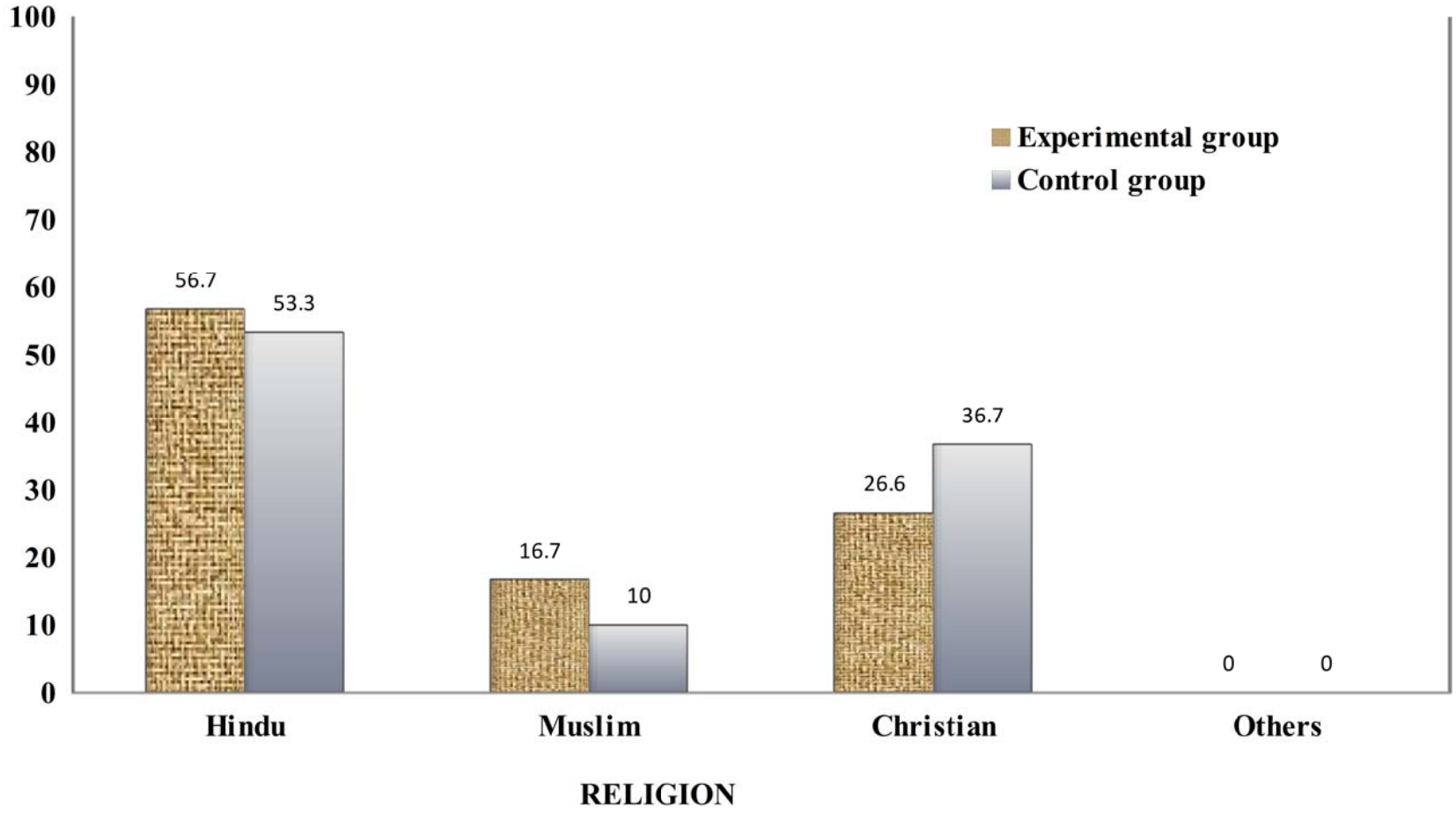


Figure 6: Percentage distribution of patients with diabetic peripheral neuropathy according to their religion in experimental and control group

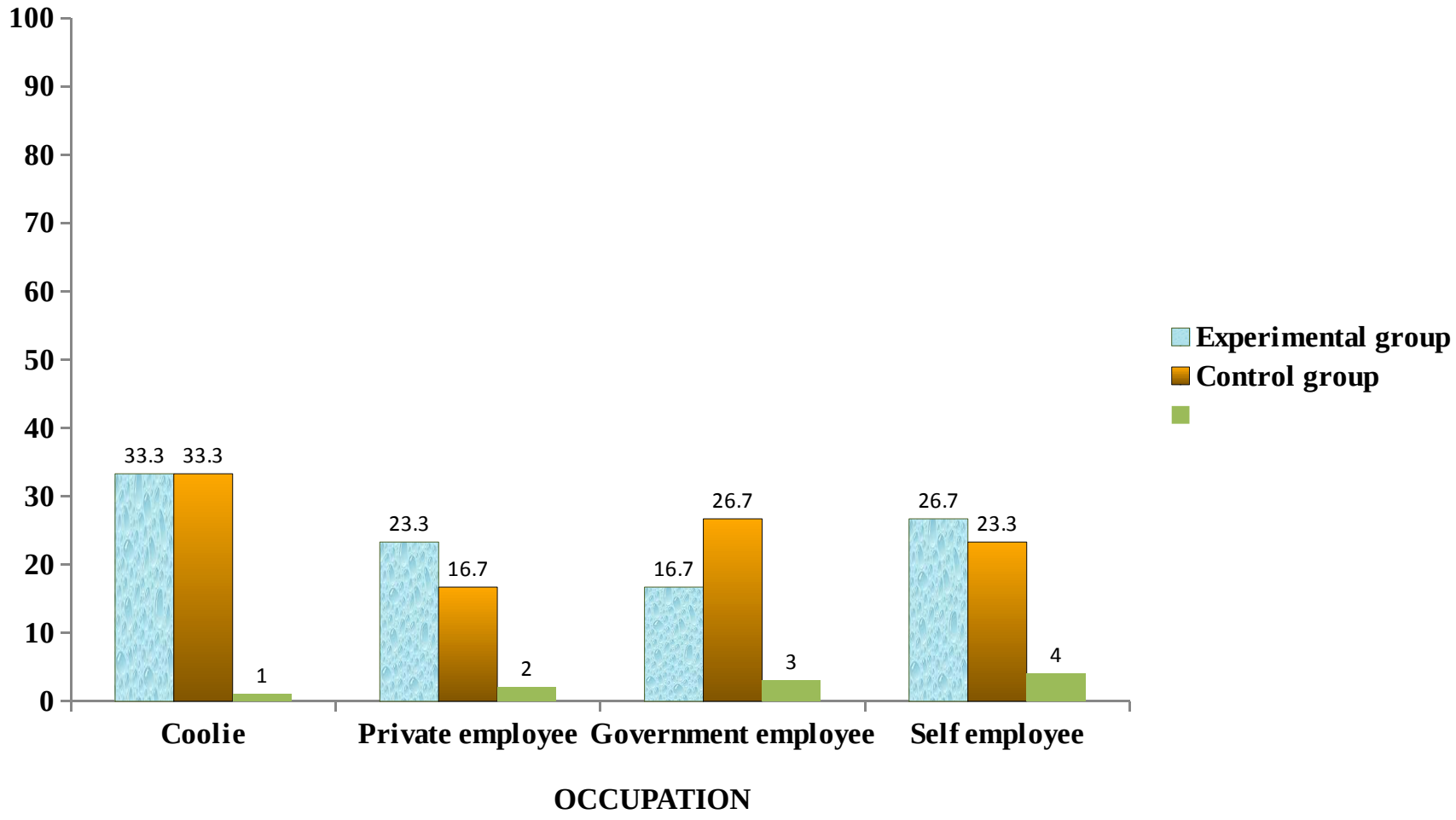


Figure 7: Percentage distribution of patients with diabetic peripheral neuropathy according to their occupation in experimental and control group.

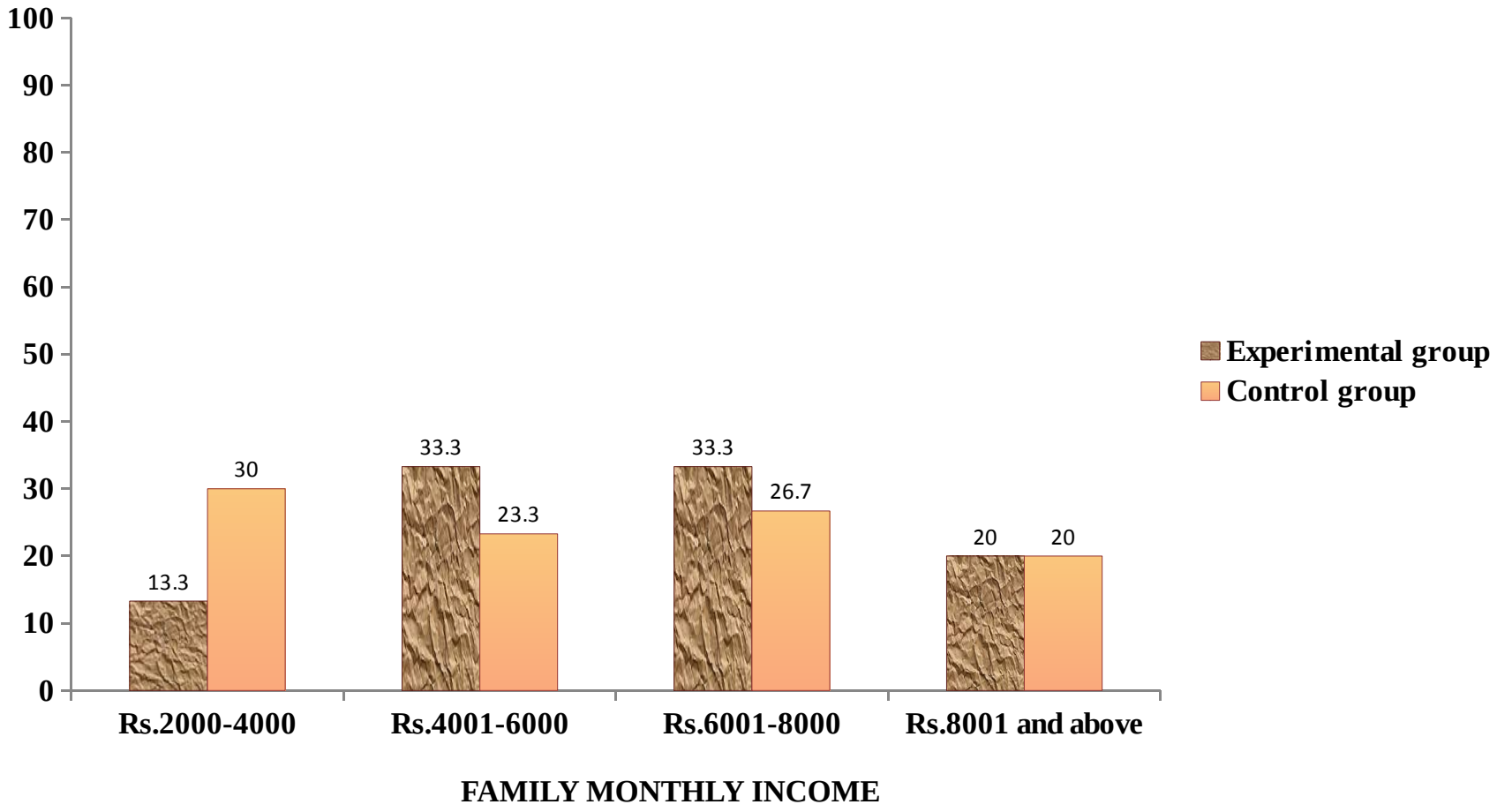


Figure 8: Percentage distribution of patients with diabetic peripheral neuropathy according to their family monthly income in experimental and control group.

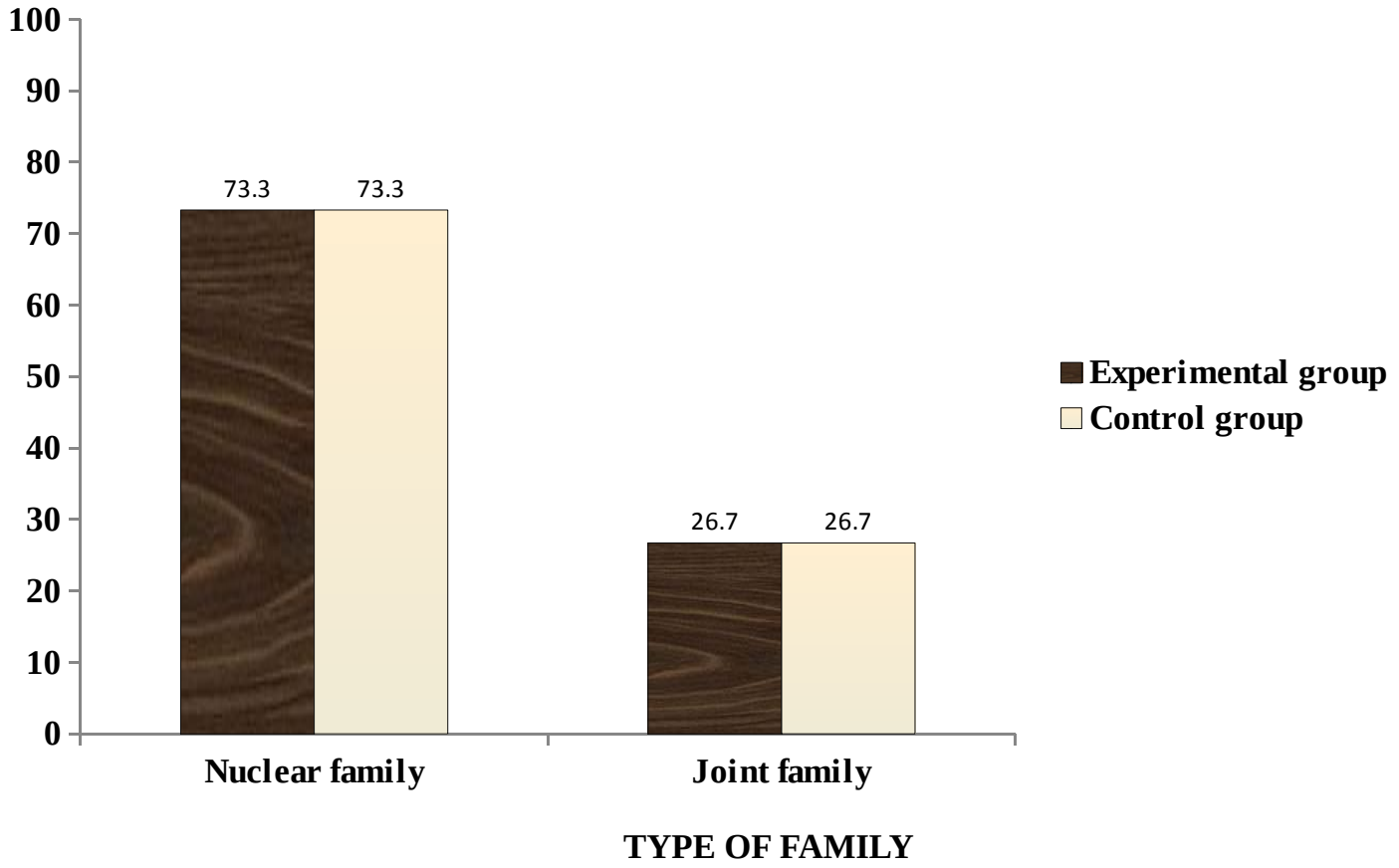


Figure 9: Percentage distribution of patients with diabetic peripheral neuropathy according to their type of family in experimental and control group.

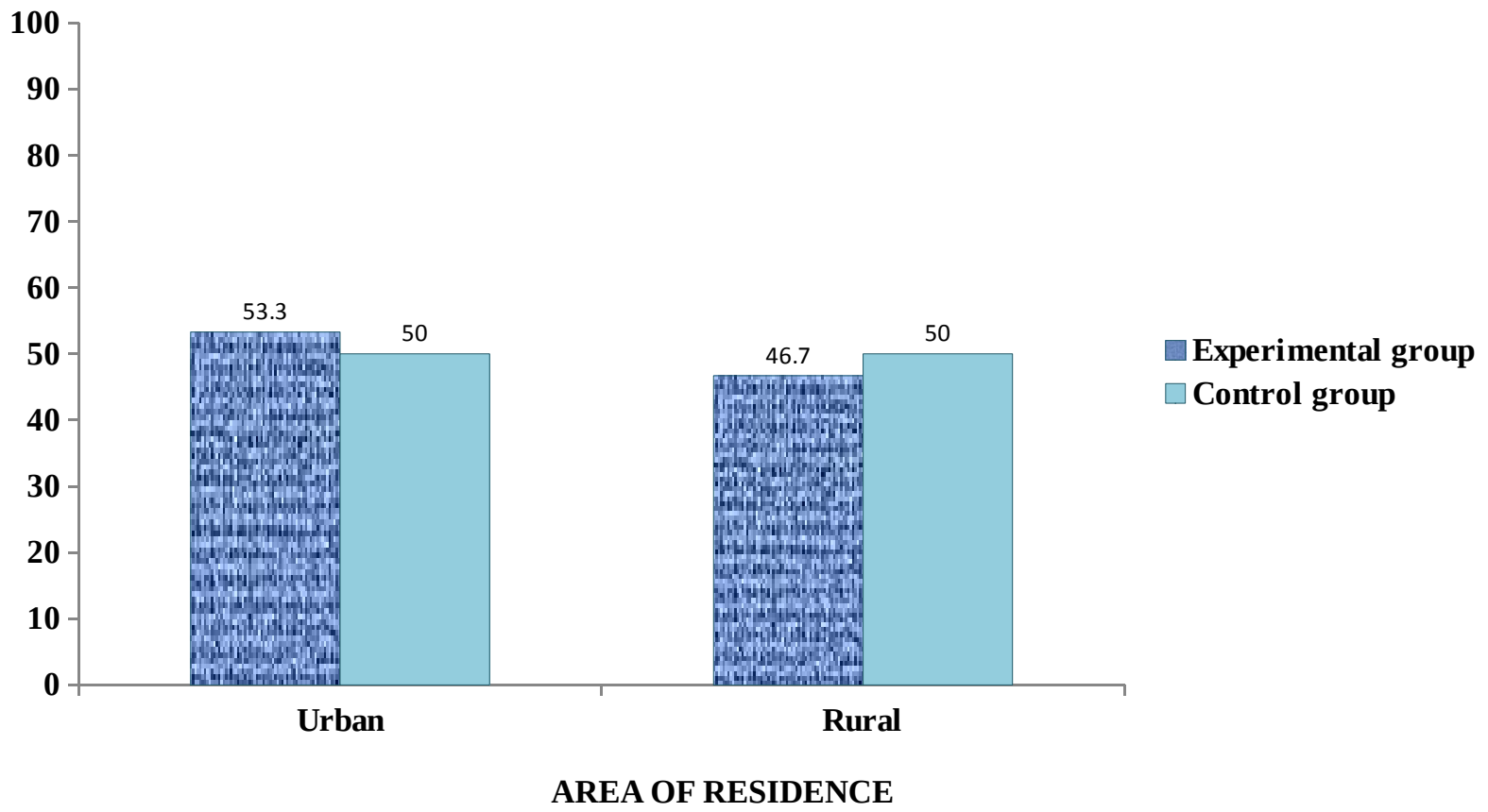


Figure 10: Percentage distribution of patients with diabetic peripheral neuropathy according to their area of residence in experimental and control group.

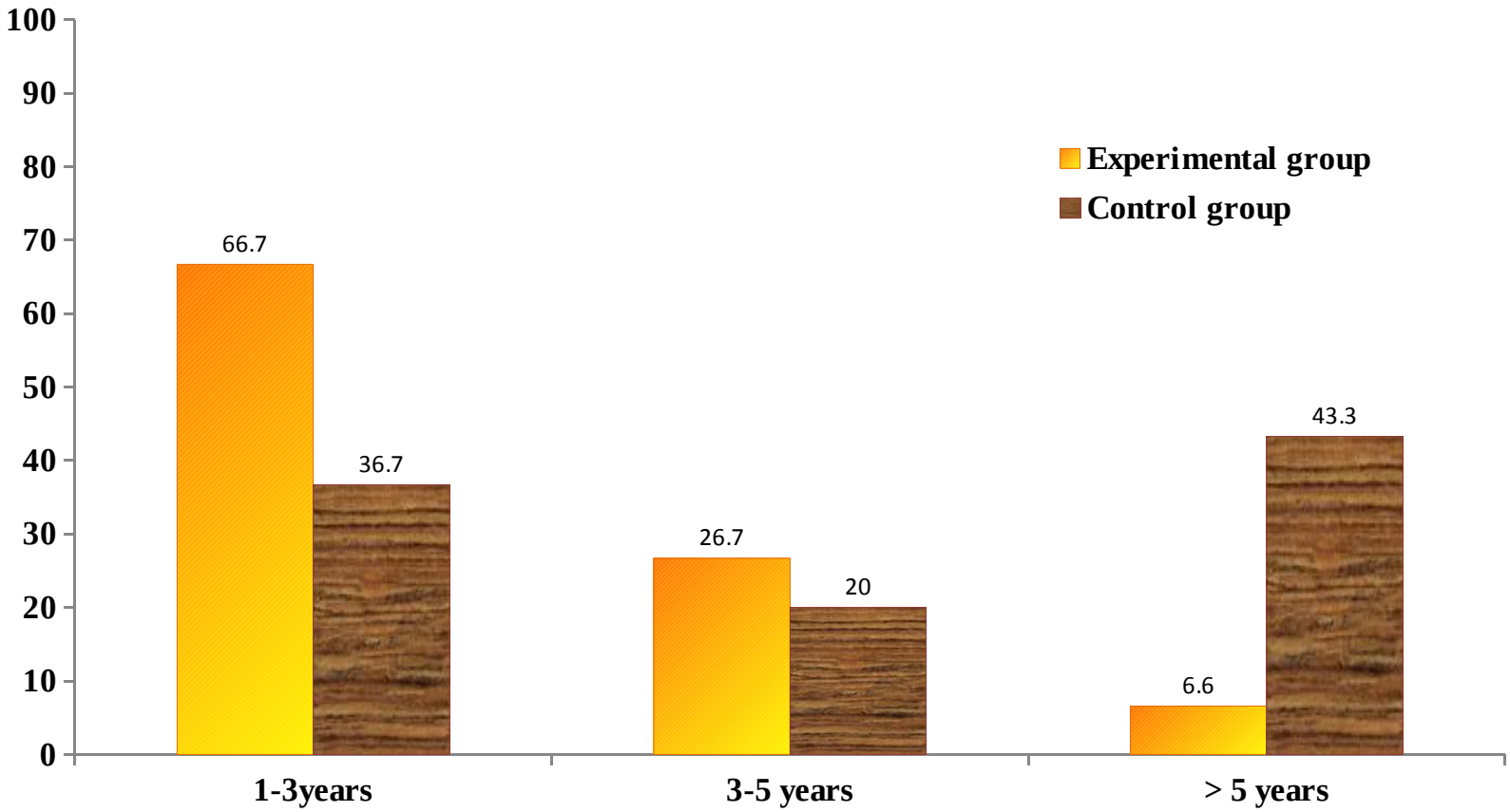


Figure 11: Percentage distribution of patients with diabetic peripheral neuropathy according to their duration of diabetic peripheral neuropathy in experimental and control group.

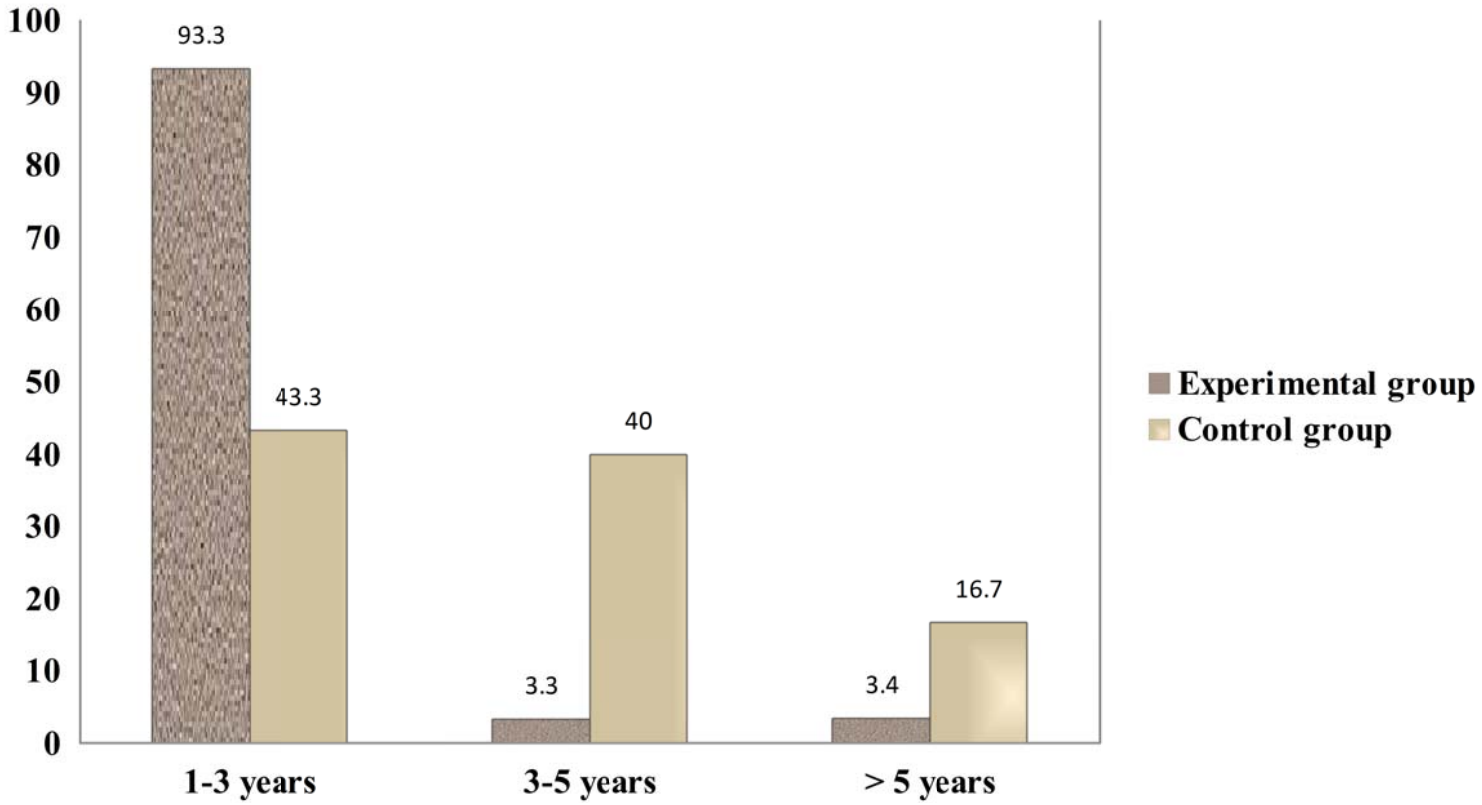


Figure 12: Percentage distribution of patients with diabetic peripheral neuropathy according to their duration of treatment for diabetic peripheral neuropathy in experimental and control group.

SECTION B : ASSESS THE PRETEST AND POST TEST LEVEL OF PAIN AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY IN EXPERIMENTAL AND CONTROL GROUP.

TABLE 2 : Frequency and percentage distribution of pre test and post test level of pain among patients with diabetic peripheral neuropathy in experimental and control group

n_1 =30 n_2 =30

S. No	LEVEL OF PAIN	PRETEST				POSTTEST			
		Experimental group		Control group		Experimental group		Control group	
		F	%	F	%	F	%	F	%
1	Non neuropathic pain	-	-	-	-	24	80	1	3.3
2	Mild neuropathic pain	6	20	10	33.3	6	20	14	46.7
3	Moderate neuropathic pain	16	53.3	13	43.3	-	-	13	43.3
4	Severe neuropathic pain	8	26.7	7	23.4	-	-	2	6.7

Table 2 shows that in pretest 6(20%) had mild neuropathic pain, 16(53.3%) had moderate neuropathic pain, 8 (26.7%) had severe neuropathic pain in experimental group. In control group 10 (33.3%) had mild neuropathic pain, 13(43.3%) had moderate neuropathic pain and 7 (23.4%) had severe neuropathic pain. In post test 24(80%) had non neuropathic pain, 6(20%) had mild neuropathic pain in experimental group. In control group, 1(3.3%) had non neuropathic pain, 14(46.7%) had mild neuropathic pain, 13(43.3%) had moderate neuropathic pain and 2(6.7%) had severe neuropathic pain. **(fig:13)**

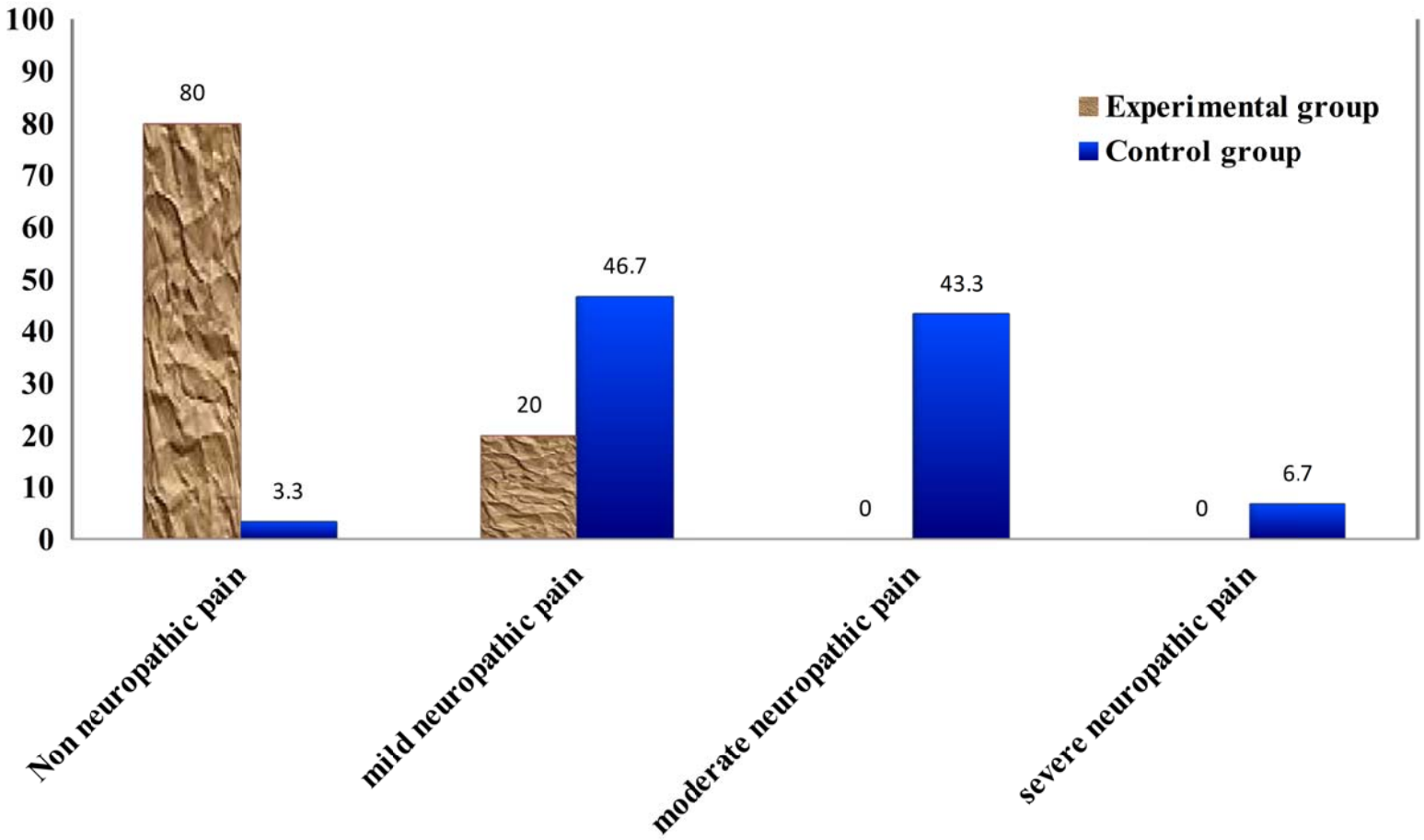


Figure :13 Frequency and percentage distribution of post test level of pain among patients with diabetic peripheral neuropathy in experimental and control group

SECTION C : ASSESS THE PRE TEST AND POST TEST LEVEL OF SLEEP AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY IN EXPERIMENTAL AND CONTROL GROUP.

TABLE 3 : Frequency and percentage distribution of pre test and post test level of sleep among patients with diabetic peripheral neuropathy in experimental and control group

n_1 =30 n_2 =30

S. No	LEVEL OF SLEEP	PRE TEST				POST TEST			
		Experimental group		Control group		Experimental group		Control group	
		F	%	F	%	F	%	F	%
1	Good sleep	-	-	-	-	16	53.3	-	-
2	Poor sleep	4	13.3	2	6.7	14	46.7	18	60
3	Very poor sleep	26	86.7	28	93.3	-	-	12	40

Table 3 shows that in pre test 4(13.3%) had poor sleep, 26(86.7%) had very poor sleep in experimental group. In control group 2(6.7%) had poor sleep, 28(93.3%) had very poor sleep. In post test 16(53.3%) had good sleep, 14(46.7%) had poor sleep in experimental group. In control group 18(60%) had poor sleep, 12(40%)had very poor sleep**.(fig 14)**

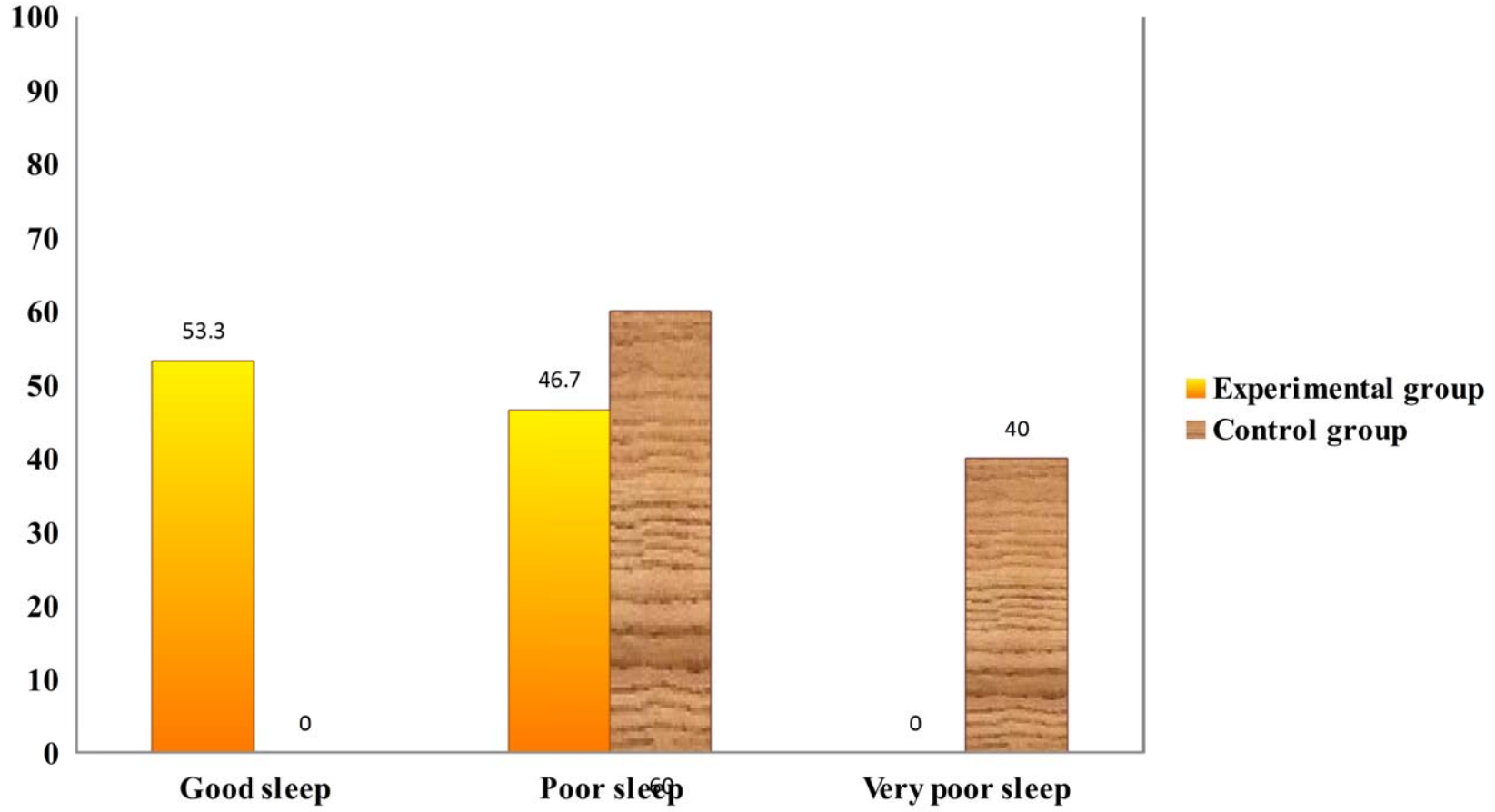


Figure : 14 Frequency and percentage distribution of post test level of sleep among patients with diabetic peripheral neuropathy in experimental and control group

SECTION D: COMPARISON BETWEEN THE PRE AND POST TEST LEVEL OF PAIN AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY IN EXPERIMENTAL GROUP

TABLE 4: Comparison of mean score, standard deviation, mean difference and paired 't' value of pretest and post test level of pain among patients with diabetic peripheral neuropathy in experimental group

n=30

S. No	Variable	Mean	Standard deviation	Mean difference	Paired 't' value	Table value	Inference
1	Pre test	18.3	2.67	7	12.82	2.045	S
2	Post test	9.6	3.15				

df= 29 S-significance p<0.05

Table 4 shows that the mean pretest and post test scores of level of pain in experimental group is 18.3 (SD$\pm$ 2.67) and 9.6 (SD$\pm$3.15) respectively. The mean difference is 8.7. the paired 't' value was 12.87 which was significant at $p<0.05$ level. The findings revealed that the exercises was effective in reducing the pain level among patients with diabetic peripheral neuropathy. Therefore the research hypotheses H_1 that, the mean post test level of pain score is significantly lower than the mean pre test level of pain score in experimental group, was accepted.

SECTION E: COMPARISON BETWEEN THE PRE AND POST TEST LEVEL OF SLEEP AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY IN EXPERIMENTAL GROUP.

TABLE 5: Comparison of mean score, standard deviation, mean difference and paired 't' value of pretest and post test level of sleep among patients with diabetic peripheral neuropathy in experimental group

n=30

S. No	Variable	Mean	Standard deviation	Mean difference	Paired 't' value	Table value	Inference
1	Pre test	29.1	3.23	18.6	16.39	2.045	S
2	Post test	47.7	5.56				

df= 29 S =significance p<0.05

Table 5 shows that the mean pretest and post test scores of level of sleep in experimental group is 29.1 (SD± 3.23) and 47.7 (SD±5.56) respectively. The mean difference is 18.6. the 't' value was 16.39 which was significant at $p<0.05$ level. The finding revealed that the exercises was effective in improving the level of sleep among patients with diabetic peripheral neuropathy. Therefore the research hypotheses H_2 that, the mean post test level of sleep score is significantly higher than the mean pre test level of sleep score in experimental group , was accepted

SECTION F: **FIND THE EFFECTIVENESS OF EXERCISES ON PAIN AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY BETWEEN EXPERIMENTAL AND CONTROL GROUP**

TABLE 6: **Effectiveness of exercises on mean score, standard deviation, mean difference and independent 't' value of post test level of pain among patients with diabetic peripheral neuropathy between experimental and control group**

n_1 =30 n_2 =30

Experimental Group Mean	Group	Mean	Standard deviation	Mean difference	Independent 't' value	Table value	Inference
Standard deviation Mean difference Independent't' valueT							

able valueInferenceS. No S 2.00 8.88 13.55 5.56 7.03 47.7 34.2 Control Group 1 2	df =58						

S-significance (P<0.05)							

Table 6 shows that the mean post test scores of pain among patients wit

h diabetic peripheral neuropathy in experimental and control group were 9.6 (SD ±3.15) and 15.9(SD± 2.9							

9) respectively. The mean difference was 6.3. The independent ‘t’ value was 8.51which was significant at							

p<0.05 level. The findings revealed that the exercises was effective in decreasing pain from pre to post interve							

ntio n co mp are d bet wee n exp eri me ntal and con trol gro up of pati ents wit h dia beti c peri phe ral neu rop							

ath y. The refo re the rese arc h hyp oth eses H_3 that , the mea n post test leve l of pai n scor e in exp eri me ntal gro							

up is significantly lower than the mean post test level of pain score in control group, was accepted.							

N G:

FIND THE EFFECTIVENESS OF EXERCISES ON SLEEP AMONG PATIENTS WITH DI							

ABETIC PERIPHERAL NEUROPATHY BETWEEN EXPERIMENTAL AND CONTROL GROUP							

7:

P. Effectiveness of exercises on mean score, standard deviation, mean difference and independe							

nt ‘t’ val ue of pos t test leve l of slee p am ong pati ent s wit h dia beti c per iph eral neu rop ath y bet wee							

n experimental and control group **S. No** S 2.00 8.51 6.33 1.15 2.99 9.61 5.	**n =3** **n =3**						

9							

Experimental Groupdf=58 S- significance

(P <0.05)

Table 7 shows that the mean post test scores of pain among patients with diabetic peripheral neuropathy in experimental and control group were 47.7 (SD±5.56) and 34.2(SD±7.03) respectively. The mean difference was 13.5.The independent 't' value was 8.88which was significant at p<0.05 level. The findings revealed that the exercises was effective in improving level of sleep level from pre to post intervention compared between experimental and control group of patients with diabetic peripheral neuropathy. Therefore the research hypothesis H_4 that, the mean post test level of sleep score in experimental group is significantly higher than the mean post test level of sleep score in control group,was accepted.

SECTION H: **FIND THE RELATIONSHIP BETWEEN THE POST TEST LEVEL OF PAIN AND SLEEP AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY IN EXPERIMENTAL GROUP.**

TABLE 8 : **Relationship between the post test level of pain and sleep among patients with diabetic peripheral neuropathy in experimental group.**

n=30

Sl. No	Variable	Mean	Standard deviation	Mean difference	'r' value	Table value
1	Pain	9.6	3.15	38.1	-0.9	0.349
2	Sleep	47.7	5.56			

df=28 (P <0.05)

Table 8 shows that the mean post test scores of pain and sleep among

patients with diabetic peripheral neuropathy in experimental group were 9.6(SD±3.15) and 47.7 (SD±5.56) respectively. The mean difference was 38.1. The 'r' value was -0.9 which shows that negative relationship between pain and sleep scores among patients with diabetic peripheral neuropathy in experimental group. It explains that if pain level decreased sleep pattern was improved. Therefore the research hypotheses H_5 that, there is a significant relationship between post test level of pain score and post test level of sleep score among patients with diabetic peripheral neuropathy in experimental group was accepted.

SECTION I: **ASSOCIATION BETWEEN THE POST TEST LEVEL OF PAIN AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY AND THEIR SELECTED DEMOGRAPHIC VARIABLES IN EXPERIMENTAL GROUP.**

Table:9: **Association between the post test level of Pain among patients with Diabetic Peripheral Neuropathy and their selected demographic variables in experimental group.**

n=30

S. No	Demographic Variables	Level Of Pain								χ^2	Table value	Inference
		Non neuropathic pain		Mild neuropathic pain		Moderate neuropathic pain		Severe neuropathic pain				
		F	%	F	%	F	%	F	%			

1	**Age**											
a)	30-40 years	5	16.7	1	3.3	-	-	-	-			
b)	41-50 years	9	30	3	10	-	-	-	-	3.12	16.92	NS
c)	51-55 years	6	20	1	3.3	-	-	-	-			
d)	Above 55 years	4	13.4	1	3.3	-	-		-		df=3	
2	**Sex**											
a)	Male	15	50	3	10	-	-	-	-	3.72	3.84	NS
b)	Female	9	30	3	10	-	-	-	-		df=1	
3	**Marital status**											
a)	Married	22	73.3	5	16.7	-	-	-				
b)	Unmarried	-	-	-	-	-	-	-		7.74	3.84	S
c)	Others	2	6.7	1	3.3	-	-	-			df=1	

S. No	Demographic Variables	Level Of Pain								x^2	Table Value	Inference
		Non neuro pathic pain		Mild neuro pathic pain		Moderate neuro pathic pain		Severe neuropathic pain				
		F	%	F	%	F	%	F	%			
4	**Educational status**											
a)	No formal education	4	13.4	3	10	-	-	-	-			
b)	Primary education	10	33.3	1	3.3	-	-	-	-	4.64	7.82	NS
c)	Higher secondary	5	16.7	2	6.6	-	-	-	-		df=3	
d)	Graduate	5	16.7	-	-	-	-	-	-			

5	**Religion**											
a)	Hindu	13	43.3	4	13.3	-	-	-	-			
b)	Muslim	4	13.4	1	3.3	-	-	-	-			
c)	Christian	7	23.4	1	3.3	-	-	-	-	0.39	7.82 df=3	NS
d)	Others	-	-	-	-	-	-	-	-			
6	**Occupation**											
a)	Coolie worker	7	23.4	3	10	-	-	-	-			
b)	Private employee	6	20	1	3.3	-	-	-	-			
c)	Government	4	13.3	1	3.3	-	-	-	-			
d)	employee									1.02	7.82 df=3	NS
	Self employee	7	23.4	1	3.3	-	-	-	-			
7	**Family monthly income**											
a)	Rs.2000-4000	3	10	1	3.3	-	-	-	-			
b)	Rs.4001-6000	7	23.4	3	10	-	-	-	-	9.65	7.82	S
c)	Rs.6001-8000	9	30	1	3.3	-	-	-	-		df=3	
d)	Above Rs.8001	5	16.7	1	3.3	-	-	-	-			

S. No	**Demographic Variables**	**Level Of Pain**								x^2 **2**	**Table Value**	**Inference**
		Noneuro pathic pain		**Mild neuro pathic pain**		**Moderate neuro pathic pain**		**Severe neuro pathic pain**				
		F	**%**	**F**	**%**	**F**	**%**	**F**	**%**			
8	**Types of family**											
a)	Nuclear family	18	60	4	13.3	-	-	-	-		3.84	
b)	Joint family	6	20	2	6.7	-	-		-	0.16	df=1	NS
9	**Area of residence**											
a)	Urban	14	46.7	2	6.7	-	-	-	-	1.19	3.84	NS
b)	Rural	10	33.3	4	13.3	-	-	-	-		df=1	

10	**Duration of Diabetic Peripheral Neuropathy**									1.93	5.99 df=2	NS
a)	1-3 years	17	56.7	3	10	-	-	-	-			
b)	3-5 years	5	16.7	3	10	-	-	-	-			
c)	>5 years	2	6.6	-	-	-	-	-	-			
11	**Duration of treatment for Diabetic Peripheral Neuropathy**									7.66	5.99 df=2	S
a)	1-3 years	22	73.4	6	20	-	-	-	-			
b)	3-5 years	1	3.3	-	-	-	-	-	-			
c)	>5 years	1	3.3	-	-	-	-	-	-			

NS=nonsignificance S=significance $p<0.05$

Table 9: Chi Square values were calculated to find the association between post test level of pain scores among patients with diabetic peripheral neuropathy in experimental group. The findings revealed that there was a significant association between marital status (χ^2 =7.74), family monthly income (χ^2 =9.65), duration of treatment for diabetic peripheral neuropathy (χ^2 =7.66) in experimental group at $p<0.05$ level of significance. There was no significant association between age, sex, educational status, religion, occupation, types of family, area of residence, duration of diabetic peripheral neuropathy in experimental group. Therefore the research hypothesis H_6 that, there is a significant association between post test level of pain score among patients with diabetic peripheral neuropathy and their selected demographic variables in experimental group, was rejected except for marital status, family monthly income, duration of treatment for diabetic peripheral neuropathy.

SECTION J: **ASSOCIATION BETWEEN THE POST TEST LEVEL OF SLEEP AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY AND THEIR SELECTED DEMOGRAPHIC VARIABLES IN EXPERIMENTAL GROUP.**

Table:10: **Association between the post test level of sleep among patients with Diabetic Peripheral Neuropathy and their selected demographic variables in experimental group.**

n=30

S. No	Demographic Variables	Level Of Sleep						χ^2	TABLE VALUE	INFERNCE
		Good sleep	Poor sleep	Very poor sleep						
1%F	**Age**									
a)	30-40 years	4	13.3	2	6.7	-	-			
b)	41-50 years	6	20	6	20	-	-			
c)	51-55 years	3	10	4	13.3	-	-	0.89	7.82 df=3	NS
d)	Above 55 years	3	10	2	6.7	-	-			
2	**Sex**									
a)	Male	10	33.3	8	26.7	-	-	0.1	3.84 df=1	NS
b)	Female	6	20	6	20	-	-			
3	**Marital status**									
a)	Married	15	50	12	40	-	-	0.5	3.84 df=1	NS
b)	Unmarried	-	-	-	-	-	-	5		
c)	Others	1	3.3	2	6.7	-	-			

S. No	Demographic Variables	Level Of Sleep						χ^2	TABLE VALUE	INFERNCE
		Good sleep	Poor sleep	Very poor sleep						
4%F	**Educational status**									
a)	No formal education	4	13.3	3	10	-	-			
b)	Primary education	5	16.7	6	20	-	-			
c)	Higher secondary	5	16.7	2	6.6	-	-	4.9	7.82 df=3	NS
d)	Graduate	2	6.7	3	10	-	-			

5	**Religion**									
a)	Hindu	7	23.3	9	.	-	-			
b)	Muslim	3	10	2	7	-	-	1.27	5.99 df=2	NS
c)	Christian	6	20	3	10	-	-			
d)	Others	-	-	-	-	-	-			
6	**Occupation**									
a)	Coolie worker	3	10	7	23.3	-	-			
b)	Private employee	6	20	1	3.4	-	-	5.17	7.82 df=3	NS
c)	Government employee	3	10	2	6.7	-	-			
d)	Self employee	4	13.3	4	13.3	-	-			
7	**Family monthly income**									
a)	Rs.2000-4000	3	10	1	3.3	-	-	1.9	7.82 df=3	NS
b)	Rs.4001-6000	5	16.7	5	16.7	-	-			
c)	Rs.6001-8000	6	20	4	13.3	-	-			
d)	Above Rs. 8001	2	6.7	4	13.3	-	-			
8	**Types of family**									
a)	Nuclear family	11	36.7	11	36.7	-	-	0.3	3.84 df=1	NS
b)	Joint family	5	16.6	3	10	-	-			

S. No	**Demographic Variables**	**Level Of Sleep**						χ^2	**TABLE VALUE**	**INFERNCE**
		Good sleep	**Poor sleep**	**Very poor sleep**						
9%F	**Area of residence**									
a)	Urban	10	33.3	6	20	-	-	0.65	3.84	NS
b)	Rural	6	20	8	26.7	-	-		df=1	

10	**Duration of Diabetic Peripheral Neuropathy**									
a)	1-3 years	9	30	11	36.7	-	-	2.56	5.99	NS
b)	3-5 years	5	16.7	3	10	-	-		df=2	
c)	>5 years	2	6.6	-	-	-	-			
11	**Duration of treatment for Diabetic Peripheral Neuropathy**							2.12	5.99	NS
a)	1-3 years	14	46.7	14	46.7	-	-		df=2	
b)	3-5 years	1	3.3	-	-	-	-			
c)	>5 years	1	3.3	-	-	-	-			

NS=no significance $p<0.05$

Table 10: Chi Square values were calculated to find out the association between post test level of sleep scores among patients with diabetic peripheral neuropathy. The findings revealed that there was no significant association with demographic variables in experimental group at $p<0.05$ level of significance. Therefore the research hypotheses H_7 that, there is a significant association between post test level of sleep score among patients with diabetic peripheral neuropathy and their selected demographic variables, was rejected.

CHAPTER V
DISCUSSION

This chapter deals with sample characteristics and objectives of the study. The aim of this present study was to assess the effectiveness of exercises on pain and sleep among patients with diabetic peripheral neuropathy in

selected hospitals at Erode.

DISTRIBUTION OF SAMPLE CHARECTERISTICS:

Regarding age in experimental group, majority12(40%) belonged to the age group of 41-50 years,7(23.3%) belonged to 51-55 years, 6(20%) belonged to 30-40 years and remaining 5(16.7%) belonged to above 55 years. In control group majority 14(46.7%) belonged to 41-50 years, 7(23.3%) belonged to 51-55 years, 5(16.7%) belonged to above 55 years and remaining 4 (13.3%) belonged to 30-40 years.

With regard to sex, in experimental group, 18(60%) were males and 12(40%) were females. In control group, 16(53.3%) were males and 14(46.7%) were females.

Regarding marital status in experimental group 27(90%) were married and 3(10%) were widow. In control group 30(100%) were married.

With regard to educational status in experimental group, majority of the patients 11(36.7%) had primary education, 7(23.3%) had no formal education and 7(23.3%) had higher secondary education and 5 (16.7%) were graduates. In control group, majority of the patients 12(40%) had primary education and 10(33.3%) had higher secondary education,7(23.3%) had no formal education, and 1(3.4%) were graduates .

Regarding religion in experimental group, majority 17(56.7%) belonged to Hindu religion, 8(26.6%) belonged to Christian religion and 5(16.7%) belonged to Muslim religion. In control group majority 16(53.3%) belonged to Hindu religion, 11(36.7%) belonged to Christian religion, and 3(10%) belonged to Muslim religion.

Regarding occupation in experimental group, majority 10(33.3%) were

coolie workers, 8(26.7%) were self employee, 7(23.3%) were private employee and 5(16.7%) was government employee. In control group majority 10(33.3%) were coolie workers, 8(26.7%) were government employee ,7(23,3%) were self employe,5(16.7%) were private employee.

With regard to family monthly income, in experimental group majority 10(33.3%) were in between Rs 4001-Rs.6000, 10(33.3%) were in between Rs 6001-Rs.8000, 6(20%) were in above Rs.8001 and 4 (13.4%) were Rs.2000-Rs.4000. In control group majority 9(30%) were in between Rs 2000-Rs.4000, 8(26.7%) were in between Rs 6001-Rs.8000, 7 (23.3%) were Rs.4001-Rs.6000 and 6(20%) were above Rs.8001.

With regard to type of family in experimental group 22 (73.3%) were from nuclear family and 8(26.7%) were from joint family . In control group the patients 22(73.3%) were from nuclear family and 8(26.7%) were from joint family.

With regard to area of residence in experimental group, majority 16(53.3%) were in urban area and 14(46.7%) were in rural area. In control group majority 15(50%) were in urban area and 15(50%) were in rural area,

With regard to duration of diabetic peripheral neuropathy, in experimental group 20(66.7%) had duration of illness for 1-3 years, 8(26.7%) had duration of 3-5 years and 2(6.6%) had above 5 years. In control group majority 13(43.4%) had above 5 years, 11(36.7%) had the illness for 1- 3 years had, 6(20%) had duration of illness for 3-5 years.

With regard to duration of treatment, in experimental group 28(93.3%) had duration of treatment for a period of 1-3year ,1(3.3%) had duration of treatment for a period of 3-5 years,1(3.4%) had a duration of treatment for a period of above 5 years,. In control group majority 13(43.3%) had duration of

treatment for a period of 1-3 years, 12(40%) had duration of treatment for a period of 3-5 years, 5(16.7%) had duration of treatment for a period of above 5 years

THE FINDINGS OF THE STUDY ARE DISCUSSED ACCORDING TO THE OBJECTIVES FOLLOWS:

1. To assess the pretest and post test level of pain among patients with diabetic peripheral neuropathy in experimental and control group.
2. To assess the pre test and post test level of sleep among patients with diabetic peripheral neuropathy in experimental and control group.
3. To compare the pre and post test level of pain among patients with diabetic peripheral neuropathy in experimental group.
4. To compare the pre and post test level of sleep among patients with diabetic peripheral neuropathy in experimental group.
5. To find the effectiveness of exercises on pain among patients with diabetic peripheral neuropathy between experimental and control group.
6. To find the effectiveness of exercises on sleep among patients with diabetic peripheral neuropathy between experimental and control group.
7. To find the relationship between the post test level of pain and sleep among patients with diabetic peripheral neuropathy in experimental group.
8. To find the association between post test level of pain among patients with diabetic peripheral neuropathy and their selected demographic variables in experimental group.
9. To find the association between post test level of sleep among patients with diabetic peripheral neuropathy and their selected demographic variables in experimental group.

OBJECTIVE 1

To assess the pretest and post test level of pain among patients with diabetic peripheral neuropathy in experimental and control group.

Among diabetic peripheral neuropathy patients in pre test of experimental group majority 16 (53.3%) had moderate level of neuropathic pain, 8(26.7) had severe neuropathic pain and 6(20%) had mild neuropathic

pain. In pretest of control group majority 13(43.3%) had moderate neuropathic pain, 10(33.3%) had mild neuropathic pain, 7(23.4%) had severe neuropathic pain. In posttest level of pain in experimental group majority 24 (80%) had non neuropathic pain, 6 (20%) had mild neuropathic pain. In control group majority 14(46.7%) had mild neuropathic pain, 13(43.3%) had moderate neuropathic pain, 2(6.7%) had severe neuropathic pain, and 1(3.3%) had non neuropathic pain.

This study was consistent with the study findings of **Obrad.W. et.al., (2012)** reported that diabetic peripheral neuropathy pain in experimental group was increased in pretest (7.1±2.9) and decreased in post test(4.71±3.4). But in control group there is no marked changes of pain level (9.01±4.9 pre/ 8.53±3.79 post) ($p<0.005$)

OBJECTIVE 2

To assess the pre test and post test level of sleep among patients with diabetic peripheral neuropathy in experimental and control group.

Among diabetic peripheral neuropathy patients in pretest of experimental group majority 26(86.7%) had very poor sleep and 4(13.3%) had poor sleep. In control group majority 28(93.3%) had very poor sleep and 2(6.7%) had poor sleep. In post test of experimental group majority 16(53.3%) had good sleep and 14(46.7%) had poor sleep. In control group majority 18(60%) had poor sleep and 12(40%) had very poor sleep.

This study was consistent with the study findings of **Alexandra .D. et.al.,(2011)** who reported that diabetic peripheral neuropathy sleep in experimental group was decreased in pretest (48.1±5.9) and increased in post test (52.09±4..34). But in control group there is no marked changes of sleep level (34.7±4.9 pre/ 46.65±5.53 post).($p=<0.001$)

OBJECTIVE 3:

To compare the pre and post test level of pain among patients with diabetic peripheral neuropathy in experimental group.

The data analysis showed that the mean pretest scores of level of pain in experimental group was 18.3(SD±2.67) and post test mean score was 9.6(SD±3.15) respectively. The mean difference was 8.7. The post mean score(9.6) was lower than the pretest mean score(18.3) . The paired 't' value was12.82 which was significant at $P<0.05$ level.

This study findings consistent with the study findings of **Min Yoo.et.al., (2013)** who reported that posttest score of pain was significantly lower than the pretest score of pain level (4.95±2.83 pre test, 2.8±2.74 posttest: p=0.0073)

This study concluded that the exercises was effective in reducing the pain level among patients with diabetic peripheral neuropathy.

Therefore the research hypotheses H_1 that, the mean post test level of pain score is significantly lower than the mean pre test level of pain score in experimental group, was accepted.

OBJECTIVE 4:

To compare the pre and post test level of sleep among patients with diabetic peripheral neuropathy in experimental group.

The data analysis showed that the mean pretest and post test scores of level of sleep in experimental group was 29.1 (SD± 3.23) and 47.7 (SD± 5.56) respectively. The mean difference is 18.6. the 't' value was 16.39 which was

significant at p<0.05 level.

This study was consistent with the study findings of **Paul.et.al., [2009]** reported that the level of sleep is significantly higher in post test (56.71±7.43) than the pretest in experimental group (37.89±5.4) at p= 0.001 level of significance.

This study concluded that the exercises was effective in improving the sleep level among patients with diabetic peripheral neuropathy.

Therefore the research hypotheses H_2 that, the mean post test level of sleep score is significantly higher than the mean pre test level of sleep score in experimental group , was accepted.

OBJECTIVE 5

To find the effectiveness of exercises on pain among patients with diabetic peripheral neuropathy between experimental and control group.

The data analysis showed that the mean post test scores of pain among patients with diabetic peripheral neuropathy in experimental and control group were 9.6 (SD±3.15) and 15.9(SD±2.99) respectively. The mean difference was 6.3.The independent 't' value was 8.51which was significant at p<0.05 level.

This study was consistent with the study findings of **Anil Bhensal., (2009)** who reported that the level of pain scores is significantly lower in the experimental group(2.56±2.01) than the control group (4.50±2.48) at (Independent t=5.101) P=0.011 level of significance.

This study concluded that the exercises was effective in decreasing pain from pre to post intervention compared between experimental and control group of patients with diabetic peripheral neuropathy.

Therefore the research hypotheses H_3 that, the mean post test level of pain score in experimental group is significantly lower than the mean post test level of pain score in control group, was accepted.

OBJECTIVE 6

To find the effectiveness of exercises on sleep among patients with diabetic peripheral neuropathy between experimental and control group.

The data analysis showed that the mean post test scores of pain among patients with diabetic peripheral neuropathy in experimental and control group were 47.7 (SD±5.56) and 34.2(SD±7.03) respectively. The mean difference was 13.5.The independent 't' value was 8.88which was significant at $p<0.05$ level.

This study was consistent with the study findings of **Robin L. kruse., (2008**) reported that the level of sleep scores is significantly higher in the experimental group (73.45±8.73) than the control group (63.75±7.50) at (independent t= 9.8) $p<0.01$ level of significance.

This study concluded that the exercises was effective in improving sleep level from pre to post intervention compared between control group of patients with diabetic peripheral neuropathy.

Therefore the research hypothesis H_4 that, the mean post test level of sleep score in experimental group is significantly higher than the mean post test level of sleep score in control group, was accepted.

OBJECTIVE 7

To find the relationship between the post test level of pain and sleep among patients with diabetic peripheral neuropathy in experimental group.

The data analysis showed that the mean post test scores of pain and sleep among patients with diabetic peripheral neuropathy in experimental group were 9.6(SD±3.15) and 47.7 (SD±5.56) respectively. The mean difference was 38.1. The 'r' value was -0.9 which shows that negative

relationship between pain and sleep scores among patients with diabetic peripheral neuropathy in experimental group. It explains that if pain level decreased sleep pattern was improved.

This study was consistent with the study findings of **Jeffrey s. Gonzalez.,(2009)** that reported that pain (8.71±3.7) and sleep (53.29±4.3) had a negative relationship (r=(-0.9), p=0.01) it shows that if the pain level decreased the sleep pattern was improved in diabetic peripheral neuropathy patients.

Therefore the research hypotheses H_5 that, there is a significant relationship between post test level of pain score and post test level of sleep score among patients with diabetic peripheral neuropathy in experimental group was accepted.

OBJECTIVE 8

To find the association between post test level of pain among patients with diabetic peripheral neuropathy and their selected demographic variables in experimental group.

Chi Square values were calculated to find the association between post test level of pain scores among patients with diabetic peripheral neuropathy in experimental group. The findings revealed that there was a significant association between marital status (χ^2 =7.74), family monthly income (χ^2 =9.65), duration of treatment for diabetic peripheral neuropathy (χ^2 =7.66) in experimental group at $p<0.05$ level of significance. There was no significant association between age, sex, educational status, religion, occupation, types of family, area of residence, duration of diabetic peripheral neuropathy in experimental group. Therefore the research hypothesis H_6 there will be a significant association between post test level of pain score among patients with diabetic peripheral neuropathy and their selected demographic variables in experimental group, was rejected except marital status, family monthly income,

duration of treatment for diabetic peripheral neuropathy.

This study was consistent with the study finding of **Booya.et.al., (2012)** who reported that there was a significant association with age (χ^2=21.8) , family income (χ^2=32.3), duration of treatment (χ^2=23.98), height (χ^2=19.21) between level of pain with diabetic peripheral neuropathy.

Therefore the research hypothesis H_6 that, there is a significant association between post test level of pain score among patients with diabetic peripheral neuropathy and their selected demographic variables in experimental group, was accepted.

OBJECTIVE 9

To find the association between post test level of sleep among patients with diabetic peripheral neuropathy and their selected demographic variables in experimental group.

Chi Square values were calculated to find out association between the mean post tests levels of pain among patients with diabetic peripheral neuropathy with their selected demographic variables in experimental group. The findings revealed that there was no significant association between the mean post tests levels of pain among patients with diabetic peripheral neuropathy with their selected demographic variables for experimental group.

This study was consistent with the study finding of **Benuza.et.al.,(2009)** who reported that there was no significant association with age (χ2=0.8), family income (χ2=0.02), duration of treatment (χ2=0.19), smoking status (χ2=1.01), residence (χ2=1.13), low HDL cholesterol level (χ2=0.9) at $p<0.001$ level of significance between level of sleep with diabetic peripheral neuropathy.

Therefore the research hypotheses H_7 that, there is a significant association between post test level of sleep score among patients with diabetic peripheral neuropathy and their selected demographic variables, was rejected.

CHAPTER VI

SUMMARY, CONCLUSION, IMPLICATIONS, RECOMMENDATION AND LIMITATIONS

This chapter is discussed under 5 headings

- Summary
- Conclusion

- Implications
- Recommendation
- Limitation

SUMMARY OF THE STUDY

The aim of this present study was to assess the effectiveness of exercises on pain and sleep among patients with diabetic peripheral neuropathy in selected Hospitals at Erode. The design used for the present study was Quasi experimental non equivalent pre test and post test control group design. The conceptual frame work was based on modified "Ludwig Von Bertlanffy System theory (1968)". Sample size was 60 out of which 30 were in experimental group and 30 were in control group. Non probability purposive sampling method was used to select the samples of the study. The tool used for this study was Leeds Assessment of Neuropathic Symptoms and Signs scale to assess the level of pain and Sleep scale from medical outcomes study was used to assess the level of sleep among patients with diabetic peripheral neuropathy before and after intervention.

Every day 2-3 samples were selected for experimental and control group by using purposive sampling technique.

On 1st day in experimental group data pertaining to the demographic variables was collected and then pre test was conducted to the participants by using Leeds Assessment of Neuropathic Symptoms and Signs scale to assess the level of pain, and sleep scale from medical outcome of study to assess sleep pattern. Exercises was given to the participants which are carried out as a single session (30 minutes) per day for 15 days individually to reduce the level of pain and improve the sleeping pattern. After the intervention post test was conducted on the 16th day. For control group the demographic variables was collected then the pretest was conducted on the 1st day and on the 16th day post test was conducted by using Leeds Assessment of Neuropathic Symptoms and

Signs scale to assess the level of pain and sleep scale from medical outcome of study to assess the level of sleep. The same procedure was followed for the remaining 30 samples and data were collected.

The data was analyzed using descriptive statistics and inferential statistics.

MAJOR FINDINGS OF THE STUDY

The major findings were,

- Regarding age in experimental group, majority12(40%) belonged to the age group of 41-50 years,7(23.3%) belonged to 51-55 years, 6(20%) belonged to 30-40 years and remaining 5(16.7%) belonged to above 55 years. In control group majority 14(46.7%) belonged to 41-50 years, 7(23.3%) belonged to 51-55 years, 5(16.7%) belonged to above 55 years and remaining 4 (13.3%) belonged to 30-40 years.
- Regarding to sex, in experimental group, 18(60%) were males and 12(40%) were females. In control group, 16(53.3%) were males and 14(46.7%) were females.
- Regarding marital status in experimental group 27(90%) were married and 3(10%) were widow. In control group 30(100%) were married.
- With regard to educational status in experimental group, majority of the patients 11(36.7%) had primary education, 7(23.3%) had no formal education and 7(23.3%) had higher secondary education and 5 (16.7%) were graduates. In control group, majority of the patients 12(40%) had primary education and 10(33.3%) had higher secondary education,7(23.3%) had no formal education, and 1(3.4%) were graduates.
- Regarding religion in experimental group, majority 17(56.7%) belonged to Hindu religion, 8(26.6%) belonged to Christian religion and 5(16.7%) belonged to Muslim religion. In control group majority 16(53.3%) belonged to Hindu religion, 11(36.7%) belonged to Christian religion, and 3(10%) belonged to Muslim religion.
- Regarding occupation in experimental group, majority 10(33.3%) were

coolie workers, 8(26.7%) were self employee, 7(23.3%) were private employee and 5(16.7%) was government employee. In control group majority 10(33.3%) were coolie workers, 8(26.7%) were government employee ,7(23,3%) were self employe,5(16.7%) were private employee.

- With regard to family monthly income, in experimental group majority 10(33.3%) were in between Rs 4001-Rs.6000, 10(33.3%) were in between Rs 6001-Rs.8000, 6 (20%) were in between above Rs.8001 and 4 (13.4%) were Rs.2000-Rs.4000. In control group majority 9(30%) were in between Rs 2000-Rs.4000, 8(26.7%) were in between Rs 6001-Rs.8000, 7 (23.3%) were Rs.4001-Rs.6000 and 6(20%) were above Rs.8001.
- With regard to type of family in experimental group 22 (73.3%) were from nuclear family and 8(26.7%) were from joint family . In control group the patients 22(73.3%) were from nuclear family and 8(26.7%) were from joint family.
- With regard to area of residence belonged to experimental group, majority 16(53.3%) were in urban area and 14(46.7%) were in rural area. In control group majority15(50%) were in urban area and 15(50%) were in rural area,
- With regard to duration of diabetic peripheral neuropathy, in experimental group 20(66.7%) had duration of illness for 1-3 years, 8(26.7%) had duration of 3-5 years and 2(6.6%) had above 5 years. In control group majority 13(43.4%) had above 5 years, 11(36.7%) had the illness for 1- 3 years had, 6(20%) had duration of illness for 3-5 years.
- With regard to duration of treatment, in experimental group 28(93.3%) had duration of treatment for a period of 1-3year ,1(3.3%) had duration of treatment for a period of 3-5 years,1(3.4%) had a duration of treatment for a period of above 5 years,. In control group majority 13(43.3%) had duration of treatment for a period of 1-3 years, 12(40%) had duration of treatment for a period of 3-5 years, 5(16.7%) had duration of treatment for a period of above 5 years.

- In experimental group pretest 6(20%) had mild neuropathic pain, 16(53.3%) had moderate neuropathic pain, 8 (26.7%) had severe neuropathic pain. In control group 10 (33.3%) had mild neuropathic pain, 13(43.3%) had moderate neuropathic pain and 7 (23.4%) had severe neuropathic pain. In post test 24(80%) had non neuropathic pain, 6(20%) had mild neuropathic pain in experimental group. In control group, 1(3.3%) had non neuropathic pain, 14(46.7%) had mild neuropathic pain, 13(43.3%) had moderate neuropathic pain and 2(6.7%) had severe neuropathic pain.
- In experimental group pre test 4(13.3%) had poor sleep, 26(86.7%) had very poor sleep. In control group 2(6.7%) had poor sleep, 28(93.3%) had very poor sleep. In post test 16(53.3%) had good sleep, 14(46.7%) had poor sleep in experimental group. In control group 18(60%) had poor sleep, 12(40%)had very poor sleep.
- The mean pretest and post test scores of level of pain in experimental group was 18.3 (SD$\pm$ 2.67) and 9.6 (SD$\pm$3.15) respectively. The mean difference is 8.7. the paired 't' value was 12.87 which was significant at $p<0.05$ level.
- The mean pretest and post test scores of level of sleep in experimental group was 29.1 (SD$\pm$ 3.23) and 47.7 (SD$\pm$5.56) respectively. The mean difference is 18.6. the 't' value was 16.39 which was significant at $p<0.05$ level.
- The mean post test scores of pain among patients with diabetic peripheral neuropathy in experimental and control group were 9.6 (SD±3.15) and 15.9(SD±2.99) respectively. The mean difference was 6.3.The independent 't' value was 8.51which was significant at $p<0.05$ level.
- The mean post test scores of pain among patients with diabetic peripheral neuropathy in experimental and control group were 47.7 (SD±5.56) and 34.2(SD±7.03) respectively. The mean difference was 13.5.The independent 't' value was 8.88which was significant at $p<0.05$ level.
- The mean post test scores of pain and sleep among patients with diabetic

peripheral neuropathy in experimental group were 9.6(SD±3.15) and 47.7 (SD±5.56) respectively. The mean difference was 38.1. The 'r' value was -0.9 which shows that negative relationship between pain and sleep scores among patients with diabetic peripheral neuropathy in experimental group. It explains that if pain level decreased sleep pattern was improved.

- The association between post test level of pain scores among patients with diabetic peripheral neuropathy and their selected demographic variables in experimental group using chi square value, the findings revealed that there was a significant association between marital status (χ^2 =7.74), family monthly income (χ^2 =9.65), duration of treatment for diabetic peripheral neuropathy (χ^2 =7.66) in experimental group at $p<0.05$ level of significance. There was no significant association between age, sex, educational status, religion, occupation, types of family, area of residence, duration of diabetic peripheral neuropathy in experimental group.
- The association between post test level of sleep among patients with diabetic peripheral neuropathy and their selected demographic variable in experimental group using chi square value, the findings revealed that there was no significant association with demographic variables in experimental group at $p<0.05$ level of significance

CONCLUSION:

The present study was conducted to assess the effectiveness of exercises on pain and sleep among patients with diabetic peripheral neuropathy in selected hospital, Erode. The independent 't' value for pain was 8.51which was significant at $p<0.05$ level. The independent 't' value for sleep was 8.88 which was significant at $p<0.05$ level. The results of the study concluded that exercises was effective in reducing pain and improving sleep among patients

with diabetic peripheral neuropathy.

IMPLICATIONS

The findings of the study have certain important implication for nursing service, nursing education, nursing administration, and nursing research.

Nursing Service

- ♣ The nurse must conduct in service education about the non pharmacological measures used in treating patients with diabetic peripheral neuropathy.
- ♣ Nurse as the change agent, can introduce the various measures for the reduction of pain and improving sleep among patients with diabetic peripheral neuropathy who were admitted in the ward.
- ♣ Nursing service department can arrange health education program in OPD for teaching the patient on exercises.

Nursing Education

- ♣ The nurse educator can orient the students with alternative therapies in reducing the level of pain and improving the sleep among patients with diabetic peripheral neuropathy.
- ♣ Nurse educators should motivate the students to do mini projects on techniques to reduce pain and improve sleep among patients with diabetic peripheral neuropathy.
- ♣ Nurse educators should conduct workshops/ seminars to update the knowledge of students to promote practicing alternative therapies among patients with diabetic peripheral neuropathy.
- ♣ The nurse educator can include exercises as a mean of non pharmacological therapy in the curriculum, which can be adopted by the students and the nursing personnel

Nursing Administration

- ♣ Nurse administrator can organize continuing education program regarding promoting optimal wellbeing of patients living with diabetic peripheral neuropathy.
- ♣ Nurse administrator can organise conferences and can enhance the knowledge and practice of alternative therapies among patients with diabetic peripheral neuropathy in reducing pain and improving sleep.
- ♣ Nurse administrator can prepare and distribute information booklet about exercises to patients with diabetic peripheral neuropathy.
- ♣ Nurse administrator should conduct in service education to disseminate the research findings through continuous nursing education to all nurses.
- ♣ Pamphlets, leaflets about exercises can be made available to nursing staff in the diabetic clinics ward and to nurse educators in nursing educational institution.

Nursing Research:

- ♣ The study findings can be a baseline for further studies to build upon for improving the body of knowledge in nursing
- ♣ The study findings can be effectively utilized by the emerging researchers to conduct further studies.

RECOMMENDATION

Based on the findings the following recommendations are stated

- Similar study can be replicated in a larger samples thereby findings can be generalized to a large population.
- Comparative study can also be done between the effectiveness of various non pharmacological measures on reducing pain and improving sleep among patients with diabetic peripheral neuropathy.

- Comparative study can also be done between the effectiveness of exercises on level of depression and sleep among patients with diabetic peripheral neuropathy.
- Longitudinal study can be done between the effectiveness of exercises on patient with diabetic peripheral neuropathy.

LIMITATIONS

♣ Requested the doctors and convinced the samples in the control group to come for check up on the 16th day.

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APPENDIX – A

LETTER SEEKING PERMISSION FOR CONDUCTING THE STUDY

Dr. R. Aruyerchelvan
M.B.B.S.,M.D.,D.Diab.

Dr. N. Bhavatharini
M.B.B.S., D.Diab.
Civil Asst. Surgeon

Consultant Diabetologists

S.R.C. DIABETES CARE CENTRE, 30, Vasuki Street, Brough Road, ERODE - 1. © 2262868

13.9.14

To

The Principal,
Bishop's College of Nursing,
Dharapuram.

Dear Madam,

As per your request, I have granted permission for your MSc Nursing Candidate V. JENI, to undertake her Project – Main Study in our Centre. She has completed her Project successfully. Her Conduct & Character are very good. Best Wishes.

With kind regards

Dr. R. Aruyerchelvan

Dr..R.ARUYERCHELVAN, M.D.,D.DIAB,
Dr. N.BHAVATHARINI, D.DIAB.
SRC DIABETES CARE CENTRE
30, Vasuki St., Brough Rd., ERODE-1

APPENDIX – B

LETTER SEEKING PERMISSION FOR CONDUCTING THE STUDY

Dr. E. Thangavelu
B.Sc., M.B.B.S., P.G.D.H.Sc., (Diab).,
Cli.Diab (ADA)., C.Diab., FCD.,

M D
Diet
Drill
Drugs
Diabetes
C

MONIKA DIABETES CENTER
(Diabetes Education & Life Style Modification Center)
ATS Building, 8 - 10, Kaliyappar Street,
Nadar Medu Bus Stop, Poondurai Road, Erode - 638 002.
Cell : 99948 44344, 99441 22822, 99442 77877
E-mail : drethangavelu@yahoo.com

Date 12.9.2014.

To

The Principal
Bethesda College of Nursing,
Dharapuram.

Respected Madam

This is to certify that Ms. V. Jeni, 5 years Msc (Nsg) student has permitted to do her clinical project in our Monika Diabetes Center and now she is completed her project.

Thankyou,

Yours,

Dr. E. THANGAVELU
B.Sc., MBBS., PGDHsc., (DIABETOLOGY)
REG. NO. 51181
MONIKA DIABETES CENTER
8-10, KALIYAPPAR STREET,
NADAR MEDU, ERODE - 638 002.

APPENDIX – C

LETTER SEEKING EXPERTS OPINION FOR CONTENT VALIDITY

From

Ms.V.Jeni,
M.sc (Nursing) II Year,
Bishop's college of nursing,
Dharapuram.

To

Respected Madam / Sir,

Sub: Requisition for content validity of tool.

I am doing M.Sc(Nursing) II year in Bishop's College of Nursing, Dharapuram under The Tamil Nadu Dr.M.G.R. Medical university, Guindy, Chennai. As a partial fulfillment of my M.Sc(nursing) Degree Programme, I am conducting a research on**, "A study to assess the effectiveness of exercises on pain and sleep among patients with diabetic peripheral neuropathy at selected hospitals, Erode."**A tool has been developed for the research study. I am sending the above stated for your expert and valuable opinion. I will be thankful for your kind consideration. Kindly return it to the undersigned.

Thanking you,

Yours faithfully,

(V.JENI)

Enclosure:

1) Certificate of content validity
2) Statement of problem, objectives, operational definition, hypothesis
3) Description of the tool and tool for data collection
4) Self addressed envelope

APPENDIX – D

LIST OF EXPERTS OF VALIDATION

1) Dr.A. Rathinasamy, M.B.B.S., D.Diab.,

Consultant diabetologist
Arun hospital
Dharapuram

2) Mrs.S.Lavanya., M.Sc(N)

HOD., dept. of medical surgical nursing
Nandha college of nursing
Erode

3) Mrs Shoba.E.Merina M.Sc (N)

Reader HOD of medical surgical nursing
Sakthi college of nursing
Oddanchatram
Dindigul

4) Ms. R.Ouvai., M.Sc (N)

Asst.Professor
Shivparvathi mandradiar institute of health science
Palayakottai
Erode

5) Mrs.M.Sudhadevi.,M.Sc (N)

Assist.professor
Vellalar college of nursing
Thindal
Erode

APPENDIX – E

CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on **" A STUDY TO ASSESS THE EFFECTIVNESS OF EXERCISES ON PAIN AND SLEEP AMONG PATIENTS**

WITH DIABETIC PERIPHERAL NEUROPATHY AT SELECTED HOSPITALS, ERODE" has been validated by me and found appropriate with mentioned suggestions.

SIGNATURE :

NAME :

DESIGNATION :

COLLEGE :

Dr.A.RATHINASAMY, M.B.,B.S.,D.Diab.,
Reg. No. 473277
Consultant Diabetologist,
ARUN HOSPITAL,
DHARAPURAM-638 656,

CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on **" A STUDY TO ASSESS THE EFFECTIVNESS OF EXERCISES ON PAIN AND SLEEP AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY AT SELECTED HOSPITALS,**

ERODE” has been validated by me and found appropriate with mentioned suggestions.

SIGNATURE : S. Lavanya

H.O.D.
Dept. of Medical Surgical Nursing,
Nandha College of Nursing.
ERODE - 638 052.

NAME : S. LAVANYA

DESIGNATION : HOD, MEDICAL - SURGICAL NURSING

COLLEGE : NANDHA COLLEGE OF NURSING
ERODE.

CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on **“ A STUDY TO ASSESS THE EFFECTIVNESS OF EXERCISES ON PAIN AND SLEEP AMONG PATIENTS**

WITH DIABETIC PERIPHERAL NEUROPATHY AT SELECTED HOSPITALS, ERODE" has been validated by me and found appropriate with mentioned suggestions.

SIGNATURE :

NAME :

DESIGNATION :

COLLEGE :

Mrs. SHOBA .P. MENON, M.Sc(N).,
READER
HOD of Medical Surgical Nursing
Sakthi College of Nursing
Oddanchatram, DINDIGUL - Dist

CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on **" A STUDY TO ASSESS THE EFFECTIVNESS OF EXERCISES ON PAIN AND SLEEP AMONG PATIENTS**

WITH DIABETIC PERIPHERAL NEUROPATHY AT SELECTED HOSPITALS, ERODE" has been validated by me and found appropriate with mentioned suggestions.

SIGNATURE :

NAME : Ms. Ouvai. R

DESIGNATION : Asst. Professor.

COLLEGE : Shivparvathi Manoradiar Institute of Health Science - Palayamkottai

CERTIFICATE FOR VALIDITY

This is to certify that the standardized tool on **"A STUDY TO ASSESS THE EFFECTIVNESS OF EXERCISES ON PAIN AND SLEEP AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY AT SELECTED HOSPITALS,**

ERODE” has been validated by me and found appropriate with mentioned suggestions.

SIGNATURE :

NAME : Mrs. M. Sudhadevi

DESIGNATION : Assist. Professor.

COLLEGE : Velalar College of Nursing, Thindal, Erode

Velalar College of Nursing
Maruthi Nagar
Thinda
Erode - 638 012

APPENDIX – F

CERTIFICATE FOR ENGLISH EDITING

TO WHOMSOEVER IT MAY CONCERN

This is to certify that the dissertation work, **"A STUDY TO ASSESS THE EFFECTIVNESS OF EXERCISES ON PAIN AND SLEEP AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY AT SELECTED HOSPITALS, ERODE"** done by **Ms.V.JENI, M.Sc., (N)** Student of Bishop's College of Nursing, Dharapuram is edited for English language appropriateness by

SIGNATURE : P. Sampath

NAME : P.SAMPATH

DATE :

ADDRESS :

P.SAMPATH, M.A.,M.PHIL.,M.Ed.,
Lecturer in English,
Maharani Teacher Training Institute,
Dharapuram.

APPENDIX – G

CERTIFICATE FOR TAMIL EDITING

TO WHOMSOEVER IT MAY CONCERN

This is to certify that the dissertation work, **"A STUDY TO ASSESS THE EFFECTIVNESS OF EXERCISES ON PAIN AND SLEEP AMONG PATIENTS WITH DIABETIC PERIPHERAL NEUROPATHY AT SELECTED HOSPITALS, ERODE"** done by **Ms.V.JENI, M.Sc., (N)** Student of Bishop's College of Nursing, Dharapuram is edited for Tamil language appropriateness by

SIGNATURE : டி.எம்.செந்தில்குமார்

D.M.SENTHIL KUMAR, M.A.,B.Ed.,M.Phil
Guest Lecturer
Department of Tam...
Alagappa University Study Cen...
DHARAPURAM - 638656

NAME : டி.எம்.செந்தில்குமார்

DATE :

ADDRESS :

APPENDIX – H

TOOL

PART -I

ENGLISH

DEMOGRAPHIC VARIABLES

1. Age in years
    a) 30 – 40 years
    b) 41 – 50 years
    c) 51 – 55 years
    d) Above 55 years
2. Sex

    Male

    Female

3. Marital status
    a) Married
    b) Unmarried
    c) Others

4. Educational status
    a) No formal education
    b) Primary education
    c) Higher secondary
    d) Graduate

5. Religion
    a) Hindu
    b) Muslim
    c) Christian
    d) Other

6. Occupation
    a) Coolie worker
    b) Private employee
    c) Government employee
    d) Self employee

7. Income
   a) RS.2000-4000
   b) RS 4001-6000
   c) RS.6001-8000
   d) RS 8001 and above

8. Types of family
   a) Nuclear family
   b) Joint family

9. Area of Residence
   a) Urban
   b) Rural

10. Duration of diabetic peripheral neuropathy
   a) 1-3 years
   b) 3-5 years
   c) >5 years

12. Duration of diabetic peripheral neuropathy treatment
   a) 1-3 years
   b) 3-5years
   c) >5years

LEEDS ASSESSMENT OF NEUROPATHIC SYMPTOMS AND SIGNS SCALE

S.No	QUESTIONS	YES	NO

1	Would you describe your pain as strange unpleasant sensations in your skin? (e.g. pricking, tingling, pins and needles).	5	0
2	Does the skin in the painful areas look different to normal? (e.g. mottled, more red/pink than usual) .	5	0
3	Is the skin in the affected area abnormally sensitive to touch? (e.g. unpleasant sensations if lightly stroked, painful to wear tight clothes).	3	0
4	Does your pain come on suddenly in bursts for no apparent reason when you are still? (e.g. like electric shocks, 'bursting' or 'jumping' sensations).	2	0
5	Do you feel that skin temperature in the painful area has changed (e.g. hot, burning).	1	0
6	Does stroking the affected area of skin with a piece of cotton wool produce an unpleasant painful sensation?	5	0
7	Does touching the affected area of skin with a sharp needle feel sharper or duller when compared to an area of normal skin?	3	0

SLEEP SCALE FROM THE MEDICAL OUTCOMES OF STUDY

1. How long did it usually take for you to fall asleep during the past 1week? (Circle One)

More than 60 minutes …….1

46-60 minutes……..2

31-45 minutes …….....3

16-30 minutes……..4

0-15 minutes……...…5

2. On the average, how many hours did you sleep each night during the past 1week?

0-2hours……1

3-4hours……2

5-6hours……3

7-8hours……4

How often during the past 1 week did you…(Circle One Number On Each Line)

S. No	QUESTIONS	All of the time	Most of the time	A good bit of time	Some of the time	A little of the time	None of the time
3	Feel that your sleep was not quiet (moving restlessly, feeling tense, speaking, etc., while sleeping)?	1	2	3	4	5	6
4	Get not enough sleep to feel rested upon waking in the morning?	1	2	3	4	5	6
5	Awaken with a headache?	1	2	3	4	5	6
6	Feel drowsy or sleepy during the day?	1	2	3	4	5	6
7	Have trouble falling asleep?	1	2	3	4	5	6
8	Awaken during your sleep time and have trouble falling asleep again?	1	2	3	4	5	6
9	Have trouble staying awake during the day?	1	2	3	4	5	6
10	Snore during your sleep?	1	2	3	4	5	6
11	Take naps (5 minutes or longer) during the day?	1	2	3	4	5	6
12	Did you think that you didn't slept well?	1	2	3	4	5	6

APPENDIX – I

PROCEDURE

DIABETIC PERIPHERAL NEUROPATHY FOOT EXERCISES

STEP I:

FOOT MASSAGE :

Inspect the feet before start the massage. Look for discoloration such as bluish purple spots, redness, sores, cracks in the skin, fungus on the toe nails , dark spots, cold areas or anything else that stands out as abnormal. Be sure to look in between the toes and encourage the client to do the same every day. If they cannot reach their feet, have them place in a mirror on the floor to view their feet carefully. Experiment with light pressure while you are inspecting the feet.This should take about two minutes.

Begin with some light compression, using the whole hand. Spend about one minute on each foot lightly compressing the plantar and dorsal surfaces and all but tissue from the toes to the knee.

STEP II:

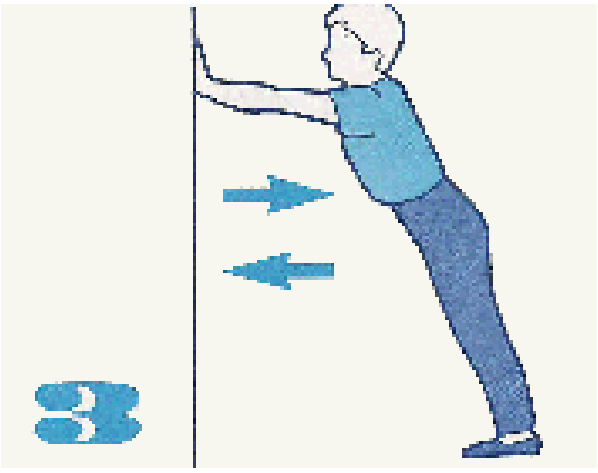
FOOT ROLLING EXERCISES:

Sit in a chair with back straight, knees together. Lift right foot off the floor, place a round thick plastic bottle under the foot. Start to move the bottle front and back. Do this exercise five times. Lower the right foot to the floor and repeat the exercise with left foot.

STEP III:

STRETCHING THE CALF MUSCLES:

Lean with the palms of the hand against a wall. Keep feet some distance away , the heels firmly on the floor. Bend arms 10 times, keeping back and legs straight.



STEP IV:

SITTING LEG POINTERS

Sit in a chair with back straight, knees together. Lift right foot off the floor, straightening the right knee at the same time. Point the toes into the distance. Holding the leg out straight. Circle the ankle joint clockwise, then counterclockwise five times. Lower the right foot to the floor and repeat the exercise with the left foot.

STEP V

TIPTOE EXERCISE:

Hold to a chair and raise and lower the body on the toes of one foot then the other.

STEP VI:

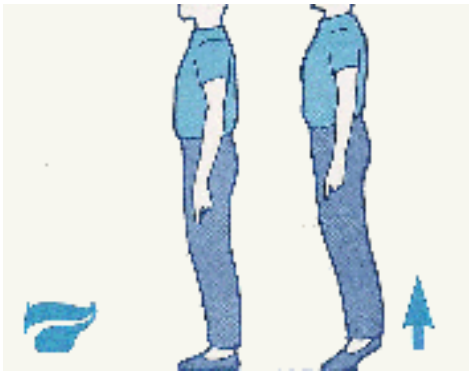
LEG BENDS:

Hold chair. Put one foot forward and lower body straight down, keeping both feet on floor. Raise and lower 10 times. Change legs.

STEP VII:

HEEL RAISING:

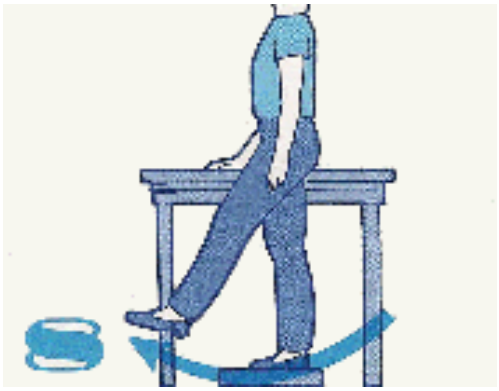
Get up on the toes and then down on heels, about 20 times. Also try putting the whole first on one leg and then the other.



STEP VIII:

LEG SWEEPS:

Stand with one leg slightly raised , on a book for example. While holding to a chair or table swing the other leg back and forth 10 times. Change to the other leg. Repeat it.

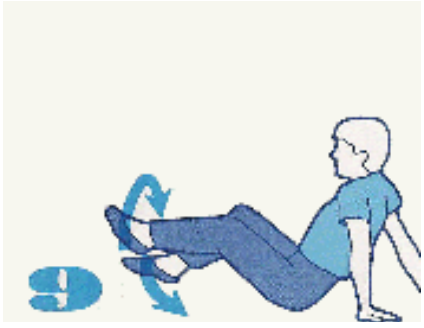


STEP IX:

WAVE YOUR FEET:

Sit down on the floor and lean backwards. Shake the feet until they are relaxed and warm.

STEP X:



MARCH EXERCISE:

Stand straight in a place. March in place lifting the knees higher each times.

Control Group

1

2